



WaterAid/ Al-Emran

Faecal Sludge Management Landscape in South Asia



Synthesis of a
Multi-country study

2019



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Multi-country study

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A plant worker preparing for emptying vacutag
in the Sakhipur co-compost plant, Tangail,
Bangladesh



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Series of drying beds at the Sakhipur co-compost plant, Tangail, Bangladesh.

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Abbreviations

ADB	Asian Development Bank
AMRUT	Atal Mission for Rejuvenation and Urban Transformation
ASCI	Administrative Staff College of India
BDT	Bangladesh Taka
BIS	Bureau of Indian Standards
BMGF	Bill and Melinda Gates Foundation
BNBC	Bangladesh National Building Code
CLTS	Community Led Total Sanitation
CPHEEO	Central Public Health and Environmental Engineering Organisation
CSOs	Civil Society Organisations
CSP	City Sanitation Plan
CSTF	City Sanitation Task Force
CT	Community Toilet
DEWATS	Decentralised wastewater treatment system
DPHE	Department of Public Health Engineering
DWSS	Department of Water Supply and Sewerage
FS	Faecal Sludge
FSM	Faecal Sludge Management
FSMNB	FSM Network Bangladesh
FSSM	Faecal Sludge and Septage Management
FSTP	Faecal Sludge Treatment Plant
GDP	Gross Domestic Product
GLAAS	Global Analysis and Assessment of Sanitation and Drinking Water
GoB	Government of Bangladesh
GoI	Government of India
GoN	Government of Nepal
GESI	Gender and Social Inclusion
GWMC	Greater Warangal Municipal Corporation
HHs	Households
IDB	Islamic Development Bank
IHHT	Individual Household Toilet

I-NGO	International Non-Governmental Organisation
INR	Indian Rupee
IRF	Institutional and Regulatory Framework
ITN-BUET	International Training Network-BUET
JMP	Joint Monitoring Program
KLD	Kilolitres Per Day
LGD	Local Government Division
LGED	Local Government Engineering Department
LGI	Local Government Institutions
LGO Act	Local Government Operation Act
MBBLs	Model Building By-laws
MDG	Millennium Development Goals
MLD	Million Litres Per Day
MoALD	Ministry of Agricultural and Livestock Development
MoFAGA	Ministry of Federal Affairs and General Administration
MoFE	Ministry of Forest and Environment
MoF	Ministry of Finance
MoHUA	Ministry of Housing and Urban Affairs
MoLGRD&C	Ministry of Local Government, Rural Development and Cooperatives
MoWS	Ministry of Water Supply
NDHS	Nepal Demographic and Health Survey
NFSSM Alliance	National Faecal Sludge and Septage Management Alliance
NFWSS	National Forum for Water Supply and Sanitation
NGO	Non-Governmental Organisation
NPC	National Planning Commission
NSHMP	National Sanitation and Hygiene Master Plan
NSP	National Sanitation Policy
NUSP	National Urban Sanitation Policy
NWSSTC	National Water Supply and Sanitation Training Centre
ODF	Open Defecation Free
OSS	On Site Sanitation
PATS	Pakistan Approach to Total Sanitation
PHED	Public Health and Environmental Division (Nepal)
PHED	Public Health Engineering Department (Pakistan)
PKR	Pakistani Rupee

PMU	Project Monitoring Units
PPE	Personal Protective Equipment
PPP Act	Private Public Partnership Act
PSB	Policy Support Branch
PSLM	Pakistan Social and Living Standards Measurement
PSP	Punjab Sanitation Policy
SAAP	State Annual Action Plans
SACOSAN	South Asian Conference on Sanitation
SBM	Swachh Bharat Mission
SDG	Sustainable Development Goals
SDP	Sector Development Plan
SEIU	Sector Efficiency Improvement Unit
SFD	Shit Flow Diagram
SLG Act	Self-Local Government Act
SMP	Septage Management Sub-Plan
STP	Sewage Treatment Plant
STWSSP	Small Town Water Supply and Sanitation Sector Project
SWA	Sector Wide Approach
TDF	Town Development Fund
TMA	Tehsil Management Authority
ULB	Urban Local Body
UNDP	United Nations Development Program
UNICEF	United Nations International Children's Emergency Fund
USAID	United State Agency for International Development
USD	US Dollar
WASA	Water Supply and Sewerage Authority
WASH	Water, Sanitation and Hygiene
WatSan	Water Supply and Sanitation
WHO	World Health Organisation
WSP	Water and Sanitation Program
WSS	Water and Sanitation Sector
WSUP	Water and Sanitation for the Urban Poor
WSUC	Water and Sanitation User's Committee
WWTP	Wastewater Treatment Plant



A worker with his safety gear at the Sakhipur co-compost plant, Tangail, Bangladesh
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1.

Executive Summary

1.1. THE CHALLENGE

The study countries of Bangladesh, India, Nepal, and Pakistan have made moderate to good progress in improving access to toilets to achieve open defecation free (ODF) status. Most urban centres in these countries still rely on pit latrines and septic tanks for treating their sewage but they lack adequate facilities, services or regulations for emptying, collecting, transporting, and treating faecal sludge. This has resulted in 90% of the sewage remaining untreated. Faecal sludge is dumped indiscriminately into rivers, drains and low-lying areas without any treatment, posing public health and environmental hazards. Urbanisation trends in these countries mean that the problem is likely to worsen if current trends continue. As a result, faecal sludge management (FSM) is increasingly becoming a necessary and integral part of the cities' sanitation service provision. Countries in South Asia are gearing up to address this post-ODF, or second generation sanitation challenge.

In the recent past, there have been some initiatives in FSM, with national and sub-national level policies being developed and leading to the creation of institutional and regulatory frameworks for FSM. FSM interventions are also being piloted and

implemented in some cities in India, Nepal and Bangladesh. The challenge and the opportunity is to enhance sanitation policies, regulations, and practices to address this issue, to avoid adverse impact on the environment and health.

1.2. AIM AND METHODOLOGY

The objective of this study is to understand the key elements of the macro level enabling framework for FSM and on-ground interventions in the study countries, focusing on one representative city in each country. The purpose is to identify best practices and common challenges and to formulate evidence-based recommendations that promote appropriate practice in making FSM an integral part of safely managed urban sanitation service delivery in cities and towns in south Asia, both with and without sewerage systems. This study is based on an extensive secondary literature review, stakeholder consultations and expert interviews in the respective cities/ countries.

1.3. ENABLING FRAMEWORKS AND CASE STUDIES

Bangladesh has been declared open defecation free and the government of Bangladesh have recognised faecal sludge management (FSM) as a focus area of

intervention in its post-2015 agenda. The country has an Institutional and Regulatory Framework for FSM which outlines roles and responsibilities as well as possible ways to implement services. Service delivery is delegated to local governments and private sector operators.

The national budget for the water, sanitation and hygiene (WASH) sector has increased by 2.5 times over the last decade. FSM is recognised as a sub-sector with financial allocation but this is currently a very small proportion of the WASH budget. There is significant support from external agencies such as the Asian Development Bank.

In the study, two case studies from Bangladesh are examined:

- Co-composting plant in Sakhipur for the treatment of sludge and solid waste using an unplanted drying bed. The city has also implemented a desludging service with a private entrepreneur collecting solid waste. Local farmers use the compost produced at the plant as a soil conditioner.
- A planted sludge drying bed in Lakshmipur along with the implementation of a desludging service. The plant requires minimal maintenance and the liquid effluent is discharged safely into environment.

Urban Pakistan was declared open defecation free in 2017 and the country was the first to adopt the Sustainable Development Goals (SDG) Agenda 2030 through its parliament by a unanimous resolution. Pakistan aims to establish

targets and national policy guidelines for water and sanitation but as yet there is no framework or policy to guide FSM interventions. There are therefore no case studies from Pakistan included in this study.

In 2018, only 0.23% of Gross Domestic Product (GDP) was spent on water and sanitation but research suggests that poor sanitation costs Pakistan 4% of its GDP each year. To facilitate the meeting of SDG targets, an allocation has been made for the establishment of the Pakistan WASH strategic planning and coordination cell in the 2018-19 budget.

Improving sanitation is a key priority of the Indian government. This is manifested in several flagship programmes such as the Swachh Bharat Mission (SBM) to clean India by eradicating open defecation by 2019. The government has already identified several post-ODF priorities which include the safe collection, conveyance, treatment and disposal of all faecal sludge.

In 2017, the National Policy on Faecal Sludge and Septage Management (FSSM) was published by the Ministry of Housing and Urban Affairs, which pays equal attention to both on-site and off-site sanitation services. Each state is expected to have an FSM policy and operative guidelines and the Urban Local Bodies (ULBs) should have resolutions to implement this directive. In most states in India, there is no separate budget for FSM.

- The full report gives the example of the city of Warangal, Telangana where two pilot treatment plants have been

constructed using new and innovative technologies. Regulations have been adopted on septic tank designs and masons have been trained in construction. There has also been a formalisation process for desludging operators and masons.

In Nepal, the Department of Water Supply and Sewerage (DWSS) claimed in 2018 that national sanitation coverage reached 98%. The Roadmap to the SDGs talks specifically about improvement of FSM as part of the approach to achieving the targets. In response to a call for a united vision on FSM, the Total Sanitation Guidelines were published in 2017 which include FSM as an indicator. Subsequently, an Institutional framework on FSM in urban areas of Nepal outlined roles and responsibilities of key institutions and provided guidelines for implementation of FSM services.

As part of Nepal's commitment to the SDGs, it has allocated 2.59% of its total budget (2017-18) to WASH but there is currently no specific allocation for FSM.

- The case study for Nepal is from Gulariya where a Decentralised Wastewater Treatment Systems (DEWATS) has been constructed with seven sludge drying beds, a settler and anaerobic baffled reactor and a planted gravel filter.

1.4. KEY FINDINGS

Three out of the four study countries are giving due importance to FSM by designating it as a sub-sector of sanitation. Those countries have ambitious FSM specific policies, providing

institutional mandates, assigning roles and encouraging the involvement of the private sector. Despite Pakistan not yet having specific mandates for FSM, there is evidence of political will. The major gap in all countries is the translation of policies into practice. In this, country-specific alliances and task forces for FSM have been key drivers in generating evidence, giving technical guidance and building up political commitment. Setting up Project Committees has also been helpful in getting interventions implemented and ensuring accountability and transparency.

There is a trend towards decentralisation with the responsibility for FSM lying with state, provincial or city governments in all four study countries. However, the technical and financial capacity at this level is often inadequate particularly in smaller towns. The commitment of local governments was most often demonstrated through the commitment of land for treatment works followed by desludging trucks and involvement in ongoing operations and maintenance.

Budget allocation for FSM remains low with limited resources allocated centrally. Most interventions in the area of FSM are based on technical and financial assistance from external agencies such as Multilateral organisations, NGOs, development partners and research institutions. The private sector plays an important role in capacity building for the sector.

Technologies trialled or implemented in the study countries were mostly appropriate for scaling up however, few

considered the entire sanitation value chain and the sustainability of the systems could not be assured.

Several key challenges remain:

- Inadequate regulatory mechanisms and capacity
- Limited proven financial sustainability through robust business models
- Insufficient local capacity for managing FSM interventions
- Lack of committed private sector service providers particularly in smaller towns
- Lack of attention to gender and social inclusion issues

1.5. KEY RECOMMENDATIONS

1. Leverage momentum through advocacy: the momentum on political commitment to FSM can be sustained through evidence-based advocacy using collaborative platforms to guide policy and resources.
2. Develop financing mechanisms: public funding is imperative and mechanisms other than direct grants must be explored. To sustain FSM service delivery operations, the private sector must be involved and innovative business models need to be piloted and scaled up including strategies for demand creation as well as the marketing of any end product.
3. Robust planning with some quick wins: politicians must be motivated enough to

champion FSM. Current data collection to support evidence-based planning is poor. So whilst this needs improving, some quick wins are also important to maintain interest and enthusiasm.

4. Regulate FSM services: regulations ensure that interventions are safe and well monitored and are therefore vital. Mechanisms that incentivise public private partnerships will also contribute towards achieving quality services.
5. Use flexible management structures: dedicated decentralised FSM cells are vital to sustaining development and innovation. External platforms like the FSM network in Bangladesh can also play a key role in providing guidance to these cells as well as city authorities and utilities.
6. Build capacity: there are many stakeholders involved in FSM and each have different capacity gaps and needs. Vocational training institutes and local academic institutions could be approached as sources of support and assistance with capacity development initiatives.
7. Prioritise the rights of sanitation workers: there is need to understand better the interplay of issues of safety, security and rights of sanitation workers in the context of FSM, so as to ensure appropriate action for equitable services both at policy and practice level.

2.

Introduction

2.1. THE CHALLENGE

South Asia has managed to provide 87% of its population with access to at least limited¹ or basic² sanitation services. In the study countries of Bangladesh, India, Nepal and Pakistan, 65% of urban residents, or 368 million people, have access to an improved latrine (14%), septic tank (44%) or sewer connected system (42%). With the successful reduction of open defecation in these countries, there are vast numbers of people who now depend on on-site sanitation, meaning sanitation systems in which excreta and wastewater are collected and stored or treated on the plot where they are generated. However, it is estimated that only 9.3% of sewerage is treated.³ Moreover, over the next two decades 320 million more people are expected to become urban residents in South Asia due to increase in area and population of the megacities, peri-urban development and a rise in the number and population of smaller cities and towns⁴, creating more pressure for services.

The sanitation problem will be amplified over the next two decades if current trends continue. Access to improved facilities will likely increase, but collection, disposal and treatment of faecal sludge from these facilities will need to be strengthened rapidly and at scale to avoid negative implications on the environment and health. There is therefore a need to consider FSM, so far neglected, as a viable and necessary priority and an integral part of the cities' sanitation service provision. This is especially true in small cities which lag behind the average urban benchmark levels significantly on all parameters of safe toilet access, safe conveyance and safe treatment and disposal (Dasgupta, 2016). FSM is understood as the process by which faecal sludge is contained, collected, transported, treated and then safely disposed of or reused, as well as the enabling environment needed for this process.

¹ Use of improved facilities shared between two or more households

² Use of improved facilities which are not shared with other households

³ <https://washdata.org/data>, accessed 16 December 2017

⁴ United Nations, Department of Economic and Social Affairs, Population Division, 2014

2.2. PURPOSE AND AIM OF THE STUDY

Countries in South Asia (SA) are gearing up to address this post- 'open defecation free', or ODF, challenge otherwise known as the second generation sanitation challenge. All the study countries are steadily moving towards achieving ODF status by the end of the current decade, with Bangladesh in the forefront having achieved ODF status in 2015. It is now recognised that sanitation systems without safe treatment and disposal are inadequate. There have been some initiatives in this direction, where national and sub-national level policies, frameworks and guidelines have been developed leading to the creation of institutional and regulatory frameworks to pilot faecal sludge treatment plants in India, Nepal, and Bangladesh. There are lessons to be learned from these interventions for policymakers, planners, city managers, experts, donors or service providers who are in the process of developing or funding improved FSM services. It is important to identify factors that enable and trigger scaling up, successes and anything that may impede the process.

The objectives of this study are to:

(i) understand key elements of the enabling framework for FSM in study countries for example policies and regulations, institutional roles and responsibilities, coordination, equity, inclusion aspects, funding and financial considerations

(ii) understand the FSM initiatives happening in the study countries, focusing on one small/medium sized city in each country. The purpose is to identify best practices⁵, gaps/challenges, the potential for scale up and formulate evidence-based policy recommendations that promote appropriate practice and further identify and disseminate lessons learned on how to make FSM an integral part of safely managed urban sanitation service delivery – in cities and towns in South Asia, both with and without sewerage systems.

2.3. METHODOLOGY

Having an enabling environment that consists of a comprehensive and coherent policy framework along with strategies at different levels, and, a regulatory framework that enhances the progress of interventions is a prerequisite to implementation of any intervention.

As a basis for this assessment, we use the key elements for examining sanitation policies as outlined in Elledge et al. (2002). The key elements constitute a range of issues recognised as important components of good sanitation policies and which also encompass multi-sector and multi-stakeholder interactions. These include: institutional roles and responsibilities; coordination; the legal framework; and, funding mechanisms including the role of innovative business models, and the role of private sector. The aim is to improve understanding of the various aspects of sanitation and/or FSM

⁵ Refers to a package of experiences that has made the intervention successful (beyond only technical solutions)

TABLE 1: Study cities

City	Country	Population
Sakhipur	Bangladesh	40,000
Lakshmipur	Bangladesh	1,50,154
Warangal	India	8,10,000
Gulariya	Nepal	66,679

policies and the institutional arrangements that enable action on the ground.

This assessment is complemented with case studies of four cities that have initiated FSM initiatives in the study countries of Bangladesh, India, and Nepal⁶. This allows for a discussion of issues that are faced during implementation, and the extent to which national sanitation policies and strategies can be identified as having influenced outcomes in the cities and vice versa. In fact, it is to be noted that FSM initiatives under this study were either established or initiated before the institutional regulatory framework clarifying the institutional roles and responsibility to deliver FSM were established in the respective countries.

The cities shown in Table 1 were selected with a focus on population (small and medium), the existence of a functioning FSM initiative, a variety of technology choices or planning approaches, possibly covering the whole sanitation chain and ease of data/information availability and collection. The key elements reviewed for city level assessment include: the initiation or trigger for the project; the planning

process; institutional setup; interventions across the sanitation value chain; and scope for scaling up.

This study uses an extensive literature review of key sanitation and hygiene policy documents, FSM policy frameworks, plans and strategies, key laws and operational guidelines, programme documents, relevant city level implementation documents, literature from secondary sources, stakeholder consultations and expert interviews in respective cities/countries⁷.

2.4. LIMITATIONS

The study is limited to information available in the public domain, particularly for the enabling environment study which was a desk-based study based on secondary sources. Macro-level information of monetary need and actual investment specific to FSM was limited as was information on performance of specific technologies. Stakeholder interviews were subject to the availability of the key personnel responsible for the specific projects and as such the data received should be considered a sample and the conclusions reached are therefore limited. As there is no FSM initiative in Pakistan, a city case study could not be completed. The sample size for this study is small and an in-depth analysis of the different challenges and possible solutions could not be attempted. This document should therefore be treated as a first step in this under-researched area.

⁶ Pakistan is yet to initiate FSM interventions in any city

⁷ See Annexure 12



A worker holding 'Sakhi Compost' - the end product produced at the Sakhipur co-compost plant, Tangail, Bangladesh

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3.

The Macro Scene

Enabling Environment of the Study Countries

This section describes the sanitation status in the four study countries and discusses the enabling frameworks in these countries to address the issue of FSM.

3.1. BANGLADESH

Status and Vision

The urban population of Bangladesh is around 55 million (2015 figure) and it is expected that by 2028-30, 48% of the population (around 96 million) will live in urban areas (Haque, 2016). Urban Bangladesh has officially been declared open defecation free (ODF).

On-site sanitation is the prevailing practice in the Pourashavas (municipalities) in Bangladesh. Table 2 shows the sanitation status by service level for Bangladesh. The lack of data under 'safely managed' shows that information on services beyond containment as to how the stored waste is removed from on-site systems, transported, then treated and safely disposed is lacking.

TABLE 2: Status of access to sanitation in Bangladesh

Year	Location	Population (millions)	Population as percentage of total (%)	Sanitation status (%)				
				Safely managed ⁸	Basic	Limited	Unimproved	Open Defecation
2000	Total	131	n/a		25	12	44	18
	Urban	31	24%		41	22	32	5
	Rural	100	76%	15**	5	9	48	22
2015	Total	161	n/a		47	22	31	0
	Urban	55	34%		54	29	18	0
	Rural	105	66%	32**	11	19	38	0

** Disposed in- situ, no treatment, Source: (JMP, 2017)

⁸ Safely managed: People use improved sanitation facilities which are not shared with other households, and the excreta produced is treated and disposed safely

Currently, Pourashavas have limited arrangements for collection from septic tanks at household levels so emptying of sludge from septic tanks is usually done manually though sometimes mechanical methods are used such as a Vacutug. Individual households employ private labourers who dispose off the sludge at places of convenience for example in drains, in dug holes, or open land and water bodies, without any treatment. Treatment for faecal sludge and septage is non-existent, except for some notable exceptions (see Annexure 1). Until now the focus has been on the capital city, Dhaka, where a sewage treatment plant (STP) with a 120MLD capacity is connected to 20% of the city population. Due to the high costs involved, there has been virtually no expansion of sewerage networks anywhere in Bangladesh over the past decades. Bangladesh thus faces a 'second-generation' or 'post-ODF' challenge - the need for Faecal Sludge Management.

The Government of Bangladesh's (GoB) long-term Perspective Plan submitted to the United Nations (UN) as its post-2015 development agenda (2016-30) is "Safe and sustainable sanitation, hygiene and drinking water used by all" (SDGs 6.2 and 6.3). FSM has been identified by the government as a major challenge for the country and one that could potentially hinder achievement of this national commitment and so FSM has been identified as a focus area of intervention.

FSM ENABLING ENVIRONMENT

The Framework

The Institutional and Regulatory Framework for FSM (IRF-FSM) was published and disseminated by the Policy Support Branch (PSB) of the Local Government Division (LGD) under the Ministry of Local Government, Rural Development and Cooperatives (MoLGRD&C) in 2017. IRF-FSM covers areas served with on-site sanitation facilities, as well as areas to be served by sewer networks and FSM services jointly. The document outlines how FSM services can be implemented and the roles and responsibilities of different institutions and stakeholders. It has its basis in the National Strategy for Water Supply and Sanitation (2014) which is an integral part of the Sector Development Plan (SDP) 2011-25 for the water and sanitation sector in Bangladesh. In the document, 17 strategies are formulated and Strategy 5 provides strategic directions to initiate and establish a proper FSM system in the country (LGD, 2014).

The legal context for the IRF-FSM includes: (i) institutional laws that provide for the establishment of local authorities and their powers and functions; (ii) municipal building by-laws, which provide a framework for containment and control of effluent, sewage and septage discharge; (iii) environmental laws which apply to the final and safe disposal of post-processed residual faecal sludge and septage to prevent contamination of groundwater, surface water and ambient air; and,

(iv) agriculture and aquaculture laws that guide the potential of use of treated faecal matter as compost, or used for aquaculture (Ahsan, et al., 2014). The IRF-FSM is not backed by any specific Act.

The Local Government Act gives Pourashavas and City Corporations the authority to impose taxes on FSM with prior government approval in their respective areas. Improper disposal of faecal sludge is treated as an offence under the Act. Bangladesh National Building Code (BNBC) specifies that the desludging of a septic tank (or Inhoff tank) should take place at six-month intervals, and once per year at a minimum. Although legal tools are in place, monitoring and enforcement are lacking.

Institutional Arrangements

The statutory responsibility for the sanitation sector is with the Local Government Division (LGD) of the MoLGRD&C. Within this Ministry, the LGD, along with the Planning Commission and the Ministry of Finance, share the responsibility of policy decisions, sectoral allocation and funding, as well as project appraisals, approval and evaluation and monitoring. The LGD is also responsible for the administrative control of the Department of Public Health Engineering (DPHE), the Local Government Engineering Department (LGED), Water and Sanitation Authorities (WASAs) and Local Government Institutions (LGIs). A Sanitation Secretariat, within the LGD, is the national focal point to guide overall sanitation improvement programmes in the country. Coordination

at the national level between government agencies, NGOs, development partners and the private sector is done through the National Forum for Water Supply and Sanitation (NFWSS), established by the LGD. Coordination at the local level is undertaken by the Water Supply and Sanitation Committees. The sector is supported by multilateral agencies, development partners, international and national NGOs, private sectors and, informal groups (LGD, 2016). A mapping of these key stakeholders is presented in Annexure 2 (LGD, 2017).

DPHE provides advisory services to the government for framing policy and action plans for the Water and Sanitation Sector (WSS) in rural and urban areas which are not served by WASAs. DPHE established an FSM support cell to plan, design and monitor the activities of capacity building, awareness campaigns, and standardisation of the services and implementation of IRF-FSM through different projects.

Pourashavas are responsible for the development and maintenance of water and sanitation services and physical infrastructure. LGED is responsible for assisting them including infrastructure projects as part of development partner-supported urban projects. Its function overlaps with the DPHE (Ahsan, et al., 2014).

The FSM Network Bangladesh (FSMNB), a network of sector practitioners, was launched in August 2016 and has been instrumental in developing the regulatory framework (IRF-FSM). The framework

was developed collaboratively with stakeholders of the sector, which include national and international non-government organisations, WASAs, DPHE, ITN-BUET and other development partners (Mansour, et al., 2017).

The government's willingness to work in partnership with NGOs, development partners, civil society, media and private organisations has opened up opportunities to form multi-stakeholder partnerships key to achieving the goal of sanitation for all. The GoB established a Policy Support Branch (PSB) in the Water Supply Wing of LGD in 2017 tasked with facilitating sectoral coordination and completion of projects including the implementation of the IRF-FSM (with support from UNICEF).

Other ongoing efforts include a working committee for the development of a National Action Plan to implement the IRF-FSM, formed by LGD. This committee advocated to include FSM issues in the political agenda of political parties in the recent elections and for the formation of a WASH Focus Group in the parliament⁹. International NGO Water and Sanitation for the Urban Poor (WSUP) is supporting the development of FSM services in low-income areas of Dhaka through an innovative Public Private Partnership arrangement under the brand name SWEEP, now being replicated in Chittagong (Rahman, 2018). SNV, Practical Action Bangladesh and WaterAid have been providing financial and/or technical support in piloting service delivery models

for urban sanitation. Despite commitments in the Sector Development Plan (SDP) to increase private sector participation, the country has yet to see the private sector involved in sanitation services on a large scale, especially in urban areas (Mansour, et al., 2017).

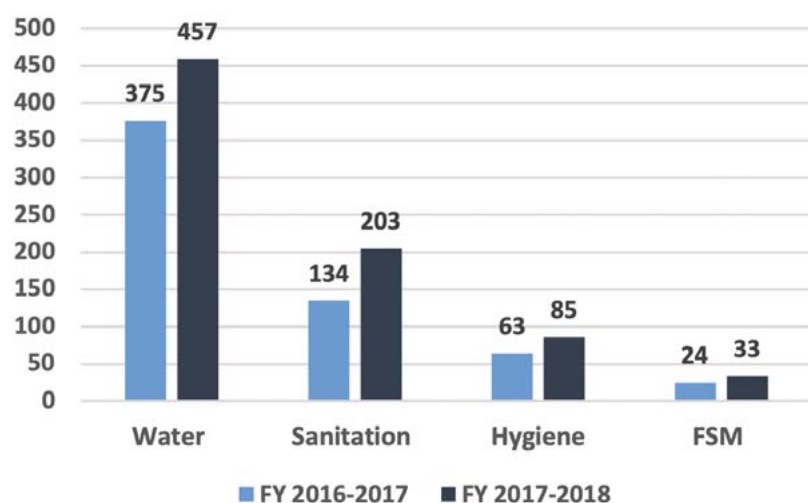
Financial Considerations

The Government of Bangladesh (GoB), considering the urgency for a FSM sub-sector, allocated USD 1.4 Million, out of total budget of USD 120 Million, in its Water and Sanitation project, to be implemented in 23 Pourashavas during July 2017-June 2021. This is jointly funded by the GoB and Islamic Development Bank (IDB). The allocation of budget for the WASH sector as a whole has increased substantially in the last decade (by 2.5 times) (Rahman, et al.). Per-head allocation of WASH budget for the urban population is USD 13.37 (DPHE). Per capita investment for FSM in national budget in financial year 2017-18 is meagre at approximately USD 0.20¹⁰, one-sixth of the sanitation budget (Figure 1). ADB has been providing assistance to the development of faecal sludge treatment plants (FSTP) but there is currently no specific allocation to FSM by multilateral funding agencies. Since 2013, the Bill & Melinda Gates Foundation (BMGF) has awarded grants of approximately USD 12 million for FSM including a grant of USD 2 million for Scaling City-wide Inclusive Sanitation/FSM in Bangladesh.

⁹ Stakeholder Consultation, 1 November 2018, Dhaka

¹⁰ Estimated by WaterAid

FIGURE 1: WASH Sub-sectoral Budget Allocation (in Million USD)



Source: WaterAid Bangladesh

Technologies Used

One of the first initiatives in FSM was by DPHE under the “Secondary Towns Water Supply and Sanitation Sector Project” (GoB-ADB) from 2006 to June 2014, in which FSTPs were constructed in 11 secondary Pourashavas. Also, an FSM Action Research project¹¹ looked at sludge management solutions in rural and small town areas of Bangladesh to test technologies suited to the context based on low cost, low resource needs and local resources. These projects informed future technology choices in FSM.

SUMMARY

In summary, Bangladesh is implementing a sector-wide approach, building on strong foundations of ODF status, and recognises FSM as a sub-sector with a financial allocation albeit meagre. The local governments are responsible for planning, policy formulation, implementation and regulation. The framework has identified the need for participatory community engagement approaches as well as the involvement of the private sector. The technologies used are suited to local conditions and available resources. There is now a need to put the framework into practice and scale up existing efforts.

¹¹ Practical Action and WaterAid worked with Buro Happold

3.2. INDIA

Status and Vision

According to the 2011 Census, 31% of the population of India, 377 million people, live in urban areas and this is expected to increase to 600 million by 2031 (SBM, 2014). The census showed that in 4,041 statutory towns, 7.9 million households do not have access to toilets and defecate in the open. Over 48% of urban households depend on on-site pit latrines and septic tanks and this proportion is increasing. This dependency is higher in smaller cities (SBM, 2014). Table 3 summarises the sanitation status in India by service level, indicating that although access to toilets is high, there is work to be done on safely managing sanitation through all aspects of the sanitation value chain. India's largest cities have centralised sewerage systems that are expensive and resource-intensive, and which are unaffordable in the 7000+

small towns. There is an estimated 62,000 MLD of human waste generated in urban India. There are 816 existing municipal sewage treatment plants which have the potential to treat 38% of the waste but only 64% are functional (Central Pollution Control Board, 2015). Over 50% of municipalities have relevant policies for FSM and 442 towns in India have announced or tendered FSTPs.

Improving sanitation is a key priority of the Indian government. This is manifested in several flagship programmes such as the Swachh Bharat Mission (SBM) to clean India by eradicating open defecation by 2019, the National Rural Drinking Water Programme¹², and Namami Gange¹³ (conservation of the River Ganga). Under SBM, it is envisaged that 80% of urban households will meet their sanitation

TABLE 3: Status of access to sanitation in India

Year	Location	Population (millions)	Population as percentage of total (%)	Sanitation status (%)				
				Safely managed	Basic	Limited	Unimproved	Open Defecation
2000	Total	1,053	n/a	-	22	6	6	66
	Urban	295	28%	-	51	18	8	23
	Rural	759	72%	9	1	2	5	82
2015	Total	1,311	n/a	-	44	12	4	40
	Urban	433	33%	-	65	23	5	7
	Rural	878	67%	31	3	7	3	56

Source: (JMP, 2017)

¹² <http://indiawater.gov.in/IMISReports/>

¹³ <http://nmcg.nic.in/>

needs through newly built individual household toilets and the remaining 20% through community toilets. Transport and treatment of faecal sludge from these facilities still poses a huge challenge.

The government's vision for faecal sludge and septage management¹⁴ (FSSM) is: *"All Indian cities and towns become totally sanitised, healthy and liveable and ensure sustenance of good sanitation practices with improved On-site Sanitation Services together with FSSM to achieve optimum public health status and maintain a clean environment with special focus on the poor."*¹⁵

Post ODF, the national government has identified several priorities:

- Sustainability of ODF status and proper maintenance of toilet facilities (SBM ODF+).
- Safe collection, conveyance, treatment and disposal of all faecal sludge and sewage (SBM ODF++). A need to focus on treatment was identified in December 2018 by key sub-missions under the flagship Urban Mission Programme - Atal Mission for Rejuvenation and Urban Transformation (AMRUT).

¹⁴ In India, the government use FSSM to refer to faecal sludge (from on-site facilities) plus septage from septic tanks. In this report, the two are used fairly inter-changeably but FSSM is used when referring to Indian government policy

¹⁵ National Policy on Faecal Sludge and Septage Management, published in 2017

¹⁶ Previously, Ministry of Urban Development

¹⁷ Technical arm of the Ministry of Housing and Urban Affairs

FSM ENABLING ENVIRONMENT

The Framework

The National Urban Sanitation Policy (NUSP) 2008 defines sanitation as "safe management of human excreta, including its safe confinement, treatment and disposal and, associated hygiene-related practices." The policy aims to develop a conducive environment for the planning, adoption and implementation of sanitation services, including FSM, for the creation of community-driven, sanitary, healthy and habitable cities through provision of toilet facilities and safe disposal of waste after treatment (National Urban Sanitation Policy, 2008). To put the NUSP into action, the Ministry of Housing and Urban Affairs (MoHUA)¹⁶ issued the Septage Advisory, which supplements the NUSP. This also follows Central Public Health and Environmental Engineering Organisation (CPHEEO)¹⁷ guidelines, Bureau of Indian Standards (BIS) and other resources as a part of the city sanitation plans (CSP) being prepared and implemented by cities. Septage refers here broadly to not only faecal sludge removed from septic tanks but also that removed from pit latrines and similar on-site toilets (Advisory Note on Septage Management, 2013).

In 2017, the National Faecal Sludge and Septage Management (FSSM) Policy was published by MoHUA, which pays equal attention to both on-site and off-site sanitation services. Each state is expected to have an FSM policy and operative guidelines and the Urban Local Bodies (ULBs) should have resolutions to implement this directive. So far 19 out

of 36 States and Union Territories have published policies or Operative Guidelines on FSSM.

The FSSM Policy is based on two major sources of standards and guidelines for septage management in India: the National Building Code 2005, by BIS; and The Manual on Sewerage and Sewage Treatment 2012, by CPHEEO. The National Building Code of India and The Model Building By-laws (MBBLs), 2016 give design guidelines for septic tanks, soak pits, cesspools, leach pits, drainage fields etc. The CPHEEO Manual addresses engineering issues (sludge and septage technologies, incremental sanitation from on-site to decentralised or conventional collection, conveyance, treatment and reuse), operation and maintenance (the issues of standardising the human resources and financial resources to make the projects self-sustaining) and management (modern methods of project delivery and project validation).

The legal context for the National FSSM Policy includes: (a) municipal building by-laws, which provide a framework for control of effluent, sewage and septage discharge; (b) environmental laws which apply to the final and safe disposal of post-processed residual faecal sludge and septage to prevent contamination of groundwater, surface water and ambient air and possible use as compost; (c) laws prohibiting “manual scavenging”, which ban dry latrines and hazardous cleaning of sewers and septic tanks; and (d) institutional laws that provide for the establishment, powers and functions of local authorities.

FSSM is an integral part of the city rating exercise in which 4,000 cities participate to gain national recognition.

Institutional Responsibilities

The responsibility for the provision of sanitation facilities in the country primarily rests with local government bodies – municipalities or corporations in urban areas and gram panchayats in rural areas. Local city governments are responsible for ‘overall citywide sanitation’ including regulations, management of functions and funds, planning, asset creation, O&M for all sanitation facilities and systems including transportation, treatment and final disposal (WaterAid, 2016). The state and central governments act as facilitators. Annexure 4 lays out the institutional mechanism and roles and responsibilities of institutions for FSM.

The MoHUA is the coordinating agency for the formulation of policies, strategies and guidelines. It assists the states by providing financial assistance for the development of urban water supply and sanitation schemes in cities and towns. It is also responsible for the provision of necessary technical and planning support to the States and ULBs. The CPHEEO assists in preparing policy guidelines and technical manuals and is responsible for overall guidance, coordination, interpretation and dissemination as well as ensuring cohesion with the Ministry’s urban development programmes and schemes.

The World Bank’s Water and Sanitation Program directly helped develop the NUSP as well as the Advisory Note in

Septage Management 2013, and is now supporting the development of state and urban sanitation strategies. Through SBM, donors like USAID and BMGF established Project Monitoring Units (PMU) for both technical and management assistance at national level and also in some of the states. To build consensus and drive the discourse on FSSM in India, the National Faecal Sludge and Septage Management Alliance (NFSSM Alliance) was formed in 2016, which comprises of members from academia, civil societies, think tanks, research organisations, training organisations, private sector etc., to advance interdisciplinary research, capacity building, knowledge management and policy-making, with a focus on FSSM related issues across the value chain. In 2016, the NFSSM Alliance in close collaboration with the MoHUA helped to design a National Declaration towards a coherent objective on FSSM and a convergence of all urban development schemes that ultimately led to the formulation of the NFSSM Policy for India in 2017.

Financial Considerations

There are several ongoing schemes which provide financial support for FSM through the national government (e.g. AMRUT, SBM, 10% lumpsum for North-East States, Satellite Township Scheme). Based on the State Annual Action Plan (SAAP) for the period 2015-2020, a total of 15.7 billion USD is planned to be allocated to AMRUT mission cities for sewerage and septage. In most states there is no separate budget allocation for FSSM. There are several new

programmes starting up including a new FSM Mission for cities above 0.1 million people (700 million USD) and other in 600 small towns (Chary, 2019). Many States governments have earmarked public funds for FSM (~100 m USD). They may also use funds from the 14th Finance Commission to implement city FSSM plans, promote engagement of private sector participation across the sanitation service chain and encourage levying sanitation tax/ user charges to meet the O&M cost for effective FSSM operations. Since, 2013, BMGF has invested over USD 80 million in urban sanitation in India.

Technologies Used

Currently (as of 1st March 2019), there are a total of 22 functional FSTPs in India with total capacity of over 800 KLD, with another 10 FSTPs upcoming in six states of India with a total capacity of 484 KLD (Annexure 5). Different variants of the following major technologies are in use in India:

- Gravity based biological treatment technology
- Conventional waste water treatment technology
- Combined treatment with Sewerage Treatment Plant (STP) (Chary, 2019)
- New and innovative technologies including: i) Thermal process - pyrolysis ii) Geobags
- Co-composting whereby dried sludge is co-composted with municipal solid waste

SUMMARY

In India, the NFSSM Policy 2017, induces and sensitises national, state and local bodies on decentralised sanitation approaches as a viable alternative to centralised systems. It acts as a guiding document for the states by setting the context, priorities and direction for states and cities to ensure proper implementation of FSSM across urban India. Further, the proposed sub-mission for FSSM enforces GoI's commitment through allocation of financial resources. States are responsible for implementation of this policy, with flexibility to develop their own models to further the cause of FSSM. Various operational models for FSM are being implemented in various cities but the sustainability of them is yet to be ascertained.

3.3. NEPAL

Status and Vision

It is estimated that the urban population of Nepal has increased to 59.3% in 2017 from 42% in 2015 and 17% in 2011 (CBS, 2018). This has a significant bearing on urban water supply, environmental governance, and management (MoWS, 2017). The Department of Water Supply and Sewerage (DWSS) claimed in 2018 that national sanitation coverage has significantly progressed to 98% compared to JMP 2017 which reports 69.2%. Only 7.9% of households have a toilet connected to a sewer system – the rest rely on on-site sanitation systems (MOH, New ERA and ICF, 2017). Hence, FSM is an emerging challenge. Table 4 details the status, by service level.

The national vision on sanitation has been steered by the constitution of Nepal 2015, which has entitled access to clean water and sanitation for all citizens as fundamental rights (GON, 2015). The National Sanitation and Hygiene Master Plan (NSHMP) 2011 had the objective of universal sanitation access within 2017 though it is yet to be achieved. Recently, the 'Sustainable Development Goals Status and Roadmap: 2016-2030' has envisioned access to adequate and equitable sanitation and hygiene for all and the end of open defecation with improvement of FSM and sewerage networks and with special attention to the needs of women, girls and those in vulnerable situations (NPC, 2017).

TABLE 4: Status of access to sanitation in Nepal

Year	Location	Population (millions)	Urban population (%)	Sanitation status (%)				
				Safely managed	Basic	Limited	Unimproved	Open Defecation
2000	Total	23,740	100	0	19.2	8.6	7.6	64.6
	Urban	3,188	13.4	0	41.6	31.5	5.6	21.3
	Rural	20,551	86.6	0	15.7	5.1	7.9	71.3
2015	Total	28,513	100	0	46.1	19.2	4.9	29.8
	Urban	5,307	18.6	0	52.5	39.8	1.8	5.8
	Rural	23,205	81.4	0	44.7	14.5	5.5	35.3

Source: (JMP, 2017)

¹⁸ After the declaration of 293 municipalities as per new federal restructure

FSM ENABLING ENVIRONMENT

The Framework

After a successful sanitation campaign stakeholders realised the need for a common understanding, coherent vision, unified mission and collective result frameworks to sustain the ODF status and to realise 'sustainable total sanitation' as envisioned by the NSHMP (WHO, 2014). This led to the endorsement of Total Sanitation Guideline (TSG) 2017 which provides standards for sustaining ODF outcomes and initiating post-ODF activities through integrated water, sanitation and hygiene plans in municipalities and districts including FSM as an indicator for total sanitation (MoWS, 2017). The National Urban Development Strategy (2017) advocates for sewerage systems where possible and on-site treatment where it isn't (MoUD & GON, 2017).

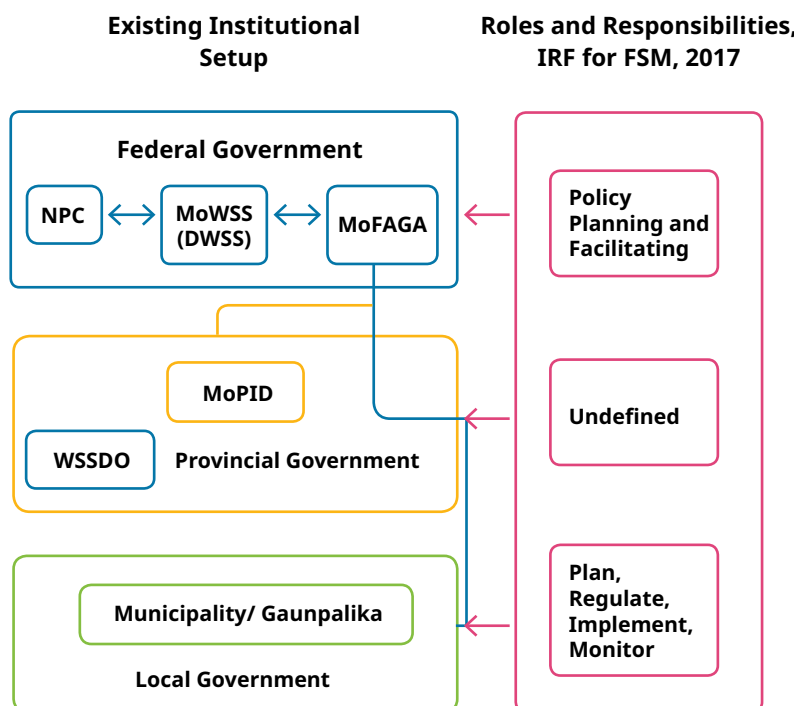
The drafted WASH National Sector Development Plan (SDP), which is currently in the process of being endorsed, provides comprehensive and strategic guidance for sector harmonisation, adopting a Sector Wide Approach and aligning the national targets on WASH with SDG 6 (MoWS, 2017). The meaning of sanitation is given in this document as: "the collection, transport, treatment and disposal or reuse of human excreta, domestic wastewater and solid waste, and associated hygiene. Sanitation refers to the hygienic means of promoting health through prevention of human contact with the hazards of wastes as well as the treatment and, proper disposal of wastewater." This definition includes FSM as a crucial element of improved sanitation.

In 2017, DWSS organised a national level workshop on FSM involving all interested stakeholders, based on which a report entitled, Faecal Sludge Management in Nepal: Key Challenges and the Way Forward, was published. The report has been the foundation for formulating the Institutional and Regulatory Framework (IRF-FSM) in Urban Areas of Nepal (Pokhrel, 2017). The main objective of this framework is to define the specific roles and responsibilities of key institutions for the effective management and regulation of FSM. It provides guidance for effective planning, implementation and monitoring of FSM services in small towns where a majority of households rely on on-site sanitation. It also provides inputs to the development of operational guidelines and capacity building of key institutions responsible for the effective management of faecal sludge (MoWS, 2017).

The regulatory framework is built upon several key documents including:

- Nepal National Building Code, 2003: provides guidelines for water supply and sanitation provision within buildings including collection and disposal of wastewater, sewage and storm-water from houses (GoN, 2003).
- Local Government Operation Act 2017, according to which it is mandatory to gain approval for buildings before construction including approval for a separate toilet and soak pit. This Act also gives local government the authority to implement sanitation programmes.
- Environmental Protection Act and Rules, 1997 and Urban Environmental Management Directives 2000.

FIGURE 2: Institutional Setup and Roles and Responsibility Envisioned in the IRF for FSM



Institutional Responsibilities

The constitution of Nepal forms the key foundation to guide, define, and frame public policy in Nepal. It has delegated the responsibility of planning and policy formation relating to sanitation to all tiers of government as depicted in Figure 2. The National Planning Commission (NPC), and DWSS under the Ministry of Water Supply (MoWS) are the key institutions at federal level responsible for formulating policies in the sector. DWSS is the main government agency for implementing water supply and sanitation programmes. The department supports Water and Sanitation User Committees (WSUC) to implement water supply and sanitation programmes.

At the federal government level, DWSS is responsible for encompassing FSM strategies and approaches in national WASH policies and acts. They also develop

and disseminate FSTP designs, provide the capital cost for installation and prepare the O&M manual. The DWSS is also responsible for strengthening institutional and management capacity of local bodies through agencies such as the National WASH Training Centre and research and academic institutions. The Ministry of Federal Affairs and General Administration (MoFAGA) is responsible for issuing policy directives to local bodies in the planning and implementation of FSM along with providing appropriate human resources and budget. Standards on effluent discharge and reuse options are devised and regulated by the Ministry of Forest and Environment (MoFE) and Ministry of Agriculture and Livestock Development (MoALD).

At the provincial government level, the Ministry of Physical Infrastructure Development deals with the construction

of physical infrastructure including water and sanitation facilities. Local governments through the Public Health and Environmental Division (PHED) have responsibility for overall planning, designing, implementing, regulating and operating of FSM services in the municipality. Wherever it is feasible, the local government will secure O&M funds for the initial years to sustain the service. The capacity of the WSUCs will be enhanced by DWSS through the National Water Supply and Sanitation Training Centre (NWSSTC).

The Industrial Enterprises Act 2016 has identified sanitation service industries as a national priority with the private sector encouraged to invest. The FSM framework includes the role of the private sector in the FSM value chain through service level agreements with the local government. They have already been involved in the emptying and transportation of the faecal sludge (ENPHO, 2017) with a service level agreement between a private company and a municipality for operating a FSTP.

The roles for NGOs as envisioned in draft SDP are: (a) providing pro-poor WASH services to unreached areas; (b) building partnerships with users and civil society to influence policy and practice and hold the public sector accountable; and, (c) bringing knowledge and innovations to the sector.

Financial Considerations

The Government of Nepal has committed to the SDGs which is reflected in its annual program and budget for the fiscal year 2017-18 which allocates around 33 billion Nepali Rupees (approximately 300 million

USD) for achieving SDG 6 related to clean water and sanitation (2.59% of the total budget) (GON, Budget Speech 2017-18, 2017). Most sanitation funding is allocated through MoWS followed by the Ministry of Finance. In the last four years, there has been a 40% increase in the education and WASH budgets and a 60% increase in the health budget (WAN, 2018) but there is currently no specific allocation for FSM. It is expected that 51% of the WASH budget will come from internal sources, 41% from external loans and 8% from external grants.

Technologies Used

There are only a few FSTPs operational in Nepal (see Annexure 6). The technologies used include gravity flow based systems (sludge drying beds and constructed wetlands) which have reuse potential in agriculture. Most of the FSM projects to date have been implemented through the Small Town Water Supply and Sanitation Sector Project (STWSSSP), implemented through the Town Development Fund (TDF).

SUMMARY

Nepal is moving towards a sector-wide approach and the recent FSM framework focuses on a decentralised and participatory approach to service delivery giving priority to basic services. Roles and responsibilities are spread through all tiers of government and the private sector are acknowledged as key players in FSM. Whilst there have been small increases in the WASH budget over recent years, there is currently no allocation specifically for FSM and there has not been much progress on implementation of technologies with only a few constructed treatment plants across the country.

3.4. PAKISTAN

Status and Vision

Pakistan is the 3rd most urbanised country in South Asia with 39% of its 200 million residents, living in urban areas (Census, 2017) (UNICEF-WHO, 2017). It is expected that by 2030 the population will reach 240 million (Zara, Rabbi, John, 2013).

Pakistan increased its improved sanitation coverage from 66% in 2000 to 83% in 2015 (UNICEF-WHO, 2015) and urban open defecation reached 0% in 2017 (UNICEF-WHO, 2017). In urban areas, only 62% of households have underground or covered drains for wastewater drainage (PSLM 2013-2014). Less than 1% of urban sewage is being treated in municipal treatment plants in Pakistan (Government of Pakistan, 2018). Wider on-site and off-site treatment data is not available.¹⁹

Table 5 details the sanitation status in Pakistan, by service level, indicating the

absence of data around safely managed sanitation.

Growing attention is being given towards building sustainable and safely managed sanitation systems. Pakistan was the first country to adopt the SDG Agenda 2030 through its parliament by a unanimous resolution and this is manifested in the strategic document 'Pakistan Vision 2025'. Pakistan has committed to an integrated approach linking sanitation with goals for nutrition, stunting, safe water and, poverty reduction. The country aims to establish Provincial and National WASH Targets for SDG-6 and develop national policy guidelines for safely managed drinking water and safely managed sanitation services (Government of Pakistan, 2018). The priority is to increase the proportion of population with access to improved sanitation from 48% to 90% by 2025.

TABLE 5: Status of access to sanitation in Pakistan

Year	Location	Population (millions)	Population as a percentage of total	Sanitation status (%)				
				Safely managed	Basic	Limited	Unimproved	Open Defecation
2000	Total	138	n/a	-	32	4	23	41
	Urban	46	33%	-	67	7	20	6
	Rural	93	67%	-	14	3	24	59
2015	Total	189	n/a	-	58	8	22	12
	Urban	74	39%	-	74	8	18	0
	Rural	115	61%	-	48	9	24	19

Source: (JMP, 2017)

¹⁹ Based on the national WASH data diagnostic study conducted by MoCC, literature review, deliberations held at national and provincial levels through SDG localisation and technical collaboration with JMP team

FSM ENABLING ENVIRONMENT

The Framework

The national Government is committed to sustainable development, poverty alleviation and safely managed sanitation as reflected in its international pledges and numerous national policy frameworks. However, there is a need for a practical framework and processes for translating these aspirations into actions and so far there is no FSM policy in development.

The 1973 Constitution of Pakistan states that the provision of sewerage supply to all is a fundamental right for citizens of Pakistan. This and the National Sanitation Policy, 2006 (NSP) are the key sanitation policy documents but there are other frameworks which support the enabling environment for sanitation. The Environmental Protection Act (EPA) 1997 covers environmental norms for wastewater and solid waste (effluent) and their risks for human health and the environment. The act is supported by legal frameworks to punish non-compliance. The provincial WASH Sector Plan 2014-24 proposed the creation of Program Management Units (PMU) at provincial levels. This unit guides implementation and reporting on the WASH plan and provides a platform for coordination, joint planning and periodic sector reviews.

The Pakistan Approach for Total Sanitation (PATS) is a holistic approach that aims to achieve and sustain an open defecation free environment for both urban and rural contexts with an emphasis on behaviour change. It combines several different approaches such as Community-Led

Total Sanitation (CLTS), School Led Total Sanitation, Component Sharing, Sanitation Marketing and Disaster Response.

The NSP plays a key role in the coordination between the national, provincial, district and town/tehsil municipal administrations (TMAs) providing broad guidelines and support to the Federal Government, Provincial Governments, Federally Administered Territories, the Local Governments and development authorities to enhance sanitation coverage through formulation of their sanitation strategies, plans, programmes and projects.

Institutional Responsibilities

At the national level, the Ministry of Climate Change (MoCC) serves as the focal point for WASH in Pakistan and is responsible for policy formulation, standards settings, reporting and coordination of regional and international commitments. In 2012, the MoCC delegated the implementation of WASH projects to the provincial governments including planning, funding, regulation and monitoring of services. In larger urban areas, this includes the development of integrated systems of water reservoirs, water sources, treatment plants, drainage, liquid and solid waste collection, disposal, and treatment, sanitation and, other municipal services. To achieve this, water and sanitation agencies, water and sanitation boards and water and sanitation services companies have been established. The Ministry of Planning, Development and Reforms holds the authority for approving provincial development programmes and the Ministry of Finance allocates and transfers funds to the provinces.

The responsibility of monitoring, controlling and surveillance of national/provincial environment quality standards on municipal/industrial effluents, drinking water, noise, air, etc. is delegated to the Provincial Environment Protection Agencies, as per the provincial EPA.

The Pakistan Council of Research and Water Resources (PCRWR) plays a significant role in the policy process in providing evidence-based advocacy and influencing policy formulation in the sectors of education, health, water, power, planning and development. The Public Health Engineering Department (PHED) is responsible for meeting the SDGs. Recently, the judiciary (Supreme Court of Pakistan) has also taken notice of water issues around the country (Dawn News, 2018).

Several challenges remain for the advancement of FSM in Pakistan:

- There is no systematic approach for data collection for sanitation and collation and performance reporting by service providers is lacking.
- There is a lack of evidence to support advocacy for FSM interventions.
- Institutional roles and responsibilities overlap and services are provided through planned and unplanned financial resources (i.e. Annual Development Plans, Parliamentarian Funds, Grants, etc.).
- Existing reporting mechanisms do not give a comprehensive picture of the sanitation sector i.e., investments, costs, outcomes, outputs, inequities, etc.

Financial Considerations

Poor sanitation costs Pakistan 3.94% of its GDP (World Bank, 2013). SDG costing tools state that Pakistan will need to allocate USD 3.14 billion per annum until 2030 to meet the target of 100% coverage of safely managed sanitation services (Government of Pakistan, 2018). Pakistan's spending on WASH in 2015-16 was USD 636 million (GLAAS Report, 2017). Public funds are the main contributor (67%), followed by collection from tariffs (13%) (PSLM 2014-2015). Only 0.23% of GDP spent on water and sanitation, a tenth of the budget spent on Education (Government of Pakistan, 2018). Funding also comes from external agencies like the UN, International NGOs and, development partners such as ADB and USAID. To facilitate SDG's 6.1 and 6.2, an allocation has been made for the establishment of the Pakistan WASH strategic planning & coordination cell (2018-2019 budget).

SUMMARY

There is no FSM Policy or Framework in place. Sanitation and water policies are aligned towards the goal of safely managed sanitation and thus these policies can guide the development of a policy for FSM interventions. Clear institutional mandates and capacity are key challenges with no clear responsibilities for FSM and no data to support progress in this area. Poor sanitation currently costs Pakistan more each year than the cost required to meet its sanitation targets but current spending on WASH is low.

3.5. COMPARATIVE ANALYSIS OF THE ENABLING ENVIRONMENT

This section compares the enabling framework for FSM in the study countries assessing the key elements of the current policy frameworks and analysing common patterns and their implications. As mentioned in Section 2.3, the key elements constitute a range of issues recognised as important components of an enabling framework: institutional roles and responsibilities, coordination, regulatory and monitoring framework, equity and inclusion, funding mechanisms, innovative business models and the role of private sector (Elledge, 2002).

Institutional Roles and Responsibilities

India, Bangladesh and Nepal, all implemented policies with specific FSM elements in 2017 and in each case the mandate and commitment came from national level ministries (albeit that the concerned department in Bangladesh was the Local Government Department of the MoLGRD&C). Budget responsibilities in the study countries rest with ministries of health, water and finance as well as sub-national governments and municipalities.

Where FSM policies exist (in India, Bangladesh and Nepal), ministries at the central level are responsible for planning and policy formulation, while regulations, implementation and operation and maintenance falls to local government agencies. This split of roles is similar in Pakistan where there is as yet no FSM specific policy. NGOs and development partners often coordinate directly with the municipalities and Community Based

Organisations (CBOs) and private sector operators play a role in supporting FSM implementation. Annexure 7 summarises the institutional roles and responsibilities in the four study countries.

Coordination

In Bangladesh, India and Nepal, FSM is a sub-sector within the larger water and sanitation sector and coordination is a major challenge to which there are varying responses. Governments in Nepal and Bangladesh have adopted Sector Wide Plans (in progress) to improve sector oversight, meet SDG targets, and identify opportunities to coordinate and align sanitation interventions and streamline funding and investments. In Bangladesh, there is also an Action Plan in development to operationalise the IRF. In Nepal, there are a number of frameworks which provide guidance for coordination between the national and municipal level stakeholders, but the role of Provincial government is still ambiguous. In India, there is an overarching policy that calls for the formation of a City Sanitation Task Force to coordinate the planning and implementation of the City Sanitation Plan (of which FSM is a part). There is no national level coordinator but the Ministry of Housing and Urban Affairs coordinates policy and programming with the states through the centrally sponsored schemes. The States coordinate with cities for policy formulation and with the Urban Local Bodies for overall technical and resource mobilisation (finance and land). There is a national Alliance for mainstreaming FSM and providing support to some states/cities.

In Pakistan, there is no clear demarcation of roles within the sanitation sector. Issue-specific coordination arrangements are made by formulating various committees. However, there is no strong coordination mechanism between sub-sectors and their stakeholders.

Regulatory and Monitoring Framework

Pakistan has not yet recognised FSM as a sub-sector, and thus no policy/framework exists. In the other three countries, the regulatory and monitoring framework supporting FSM implementation is still weak especially in terms of collection and transportation, treatment and reuse (see detailed analysis in Annexure 8). The institutional roles are defined in some cases, but not backed by guidelines, which makes FSM implementation challenging. Technical capacity, as well as human resources needed for enforcing regulatory mechanisms, is weak for all the study countries.

Equity/ Inclusion

Inequality and poverty have been considered in the relevant policies and acts but the mechanisms for mainstreaming these issues across the FSM value chain is unclear. Budgeting for gender is not the norm in all the study countries and there is weak mainstreaming of gender and social inclusion policies within institutional frameworks, guidelines and action plans for FSM.

In Nepal, water supply and sanitation projects have integrated and mainstreamed Gender and Social Inclusion (GESI) policies

and guidelines (GESI Framework, 2017) in their action plans. In Bangladesh, the National Policy on Safe Water Supply and Sanitation (1998) as well as the Sector Development Plan (2011-2025) in its Action Plan aims to ensure inclusive planning and development through the participation of and provision of services for low income communities and other vulnerable groups, such as women, children, persons with disabilities, hard to reach areas, and indigenous communities and also to addresses the issue of Menstrual Hygiene Management. India's FSSM Policy 2017 aims to promote gender mainstreaming in FSSM (not specifically FSM) whereby women are seen as "active agents and participants of change, not merely as recipients or victims of policies". In Pakistan, the different approaches like CLTS, or PATS have been cognisant of a participatory and inclusive approach, although specific guidelines for Gender and Social Inclusion have not yet been developed.

Funding

FSM Policies and frameworks have not yet been backed by adequate central funding in most of the study countries. In a very recent development in India, central funding has been committed through the FSSM submission though the operationalisation of this commitment is yet to be seen. There has been no clarity yet on the investments being made specifically for FSM²¹, other than the FSTPs in operation/in progress. FSM funding in India comes either through city/state level initiatives, part of urban development schemes or through

²¹ Exact allocation to FSM interventions is not clear as the State Annual Action Plans show consolidated allocation for the 'Sewerage and Septage Management' sector, not Septage allocation separately

international donor agencies. Bangladesh has a designated central budget allocation, although meagre, in recognition of the sub-sector. In Nepal, FSM specific allocation information is not available, although it has seen an increase in WASH budget allocation since 2014 and FSM interventions have also been considered through their Small Towns project on Water and Sanitation. Pakistan with its commitment towards Vision 2025 has increased its funding for safely managed sanitation, but it is still small, compared to investment in other development sectors.

Business Models and Private Sector Role

The need for private sector involvement is recognised in the policies and the frameworks of all the study countries. However, the modalities for operationalising and incentivising partnerships are still a work in progress. Several Public Private Partnerships (PPP) and Public Private and Community/People Partnerships (PPCP) are being piloted.

In India, the FSSM Policy 2017 emphasises that State Government and Urban Local Bodies should facilitate the involvement of private sector participation through an easy and amenable PPP relationship framework, to ensure adequate financing and sustainability of FSSM projects (Ministry of Urban Development, National Policy on FSSM, 2017). Innovative models of PPP

are emerging in many cities of India. In Bangladesh, beyond toilet construction (usually done by local masons) and manual emptying performed by sweepers, the involvement of private operators in the sanitation sector is very limited. Despite commitments in the Sector Development Plan to increase private sector participation, the country has yet to see large scale private sector involvement (Dasgupta, 2016). Nepal has established the legal basis, with supporting policies, for private sector management of water supply schemes and independent fee setting and regulation in urban settings, although low tariff levels have been a major barrier to attracting the domestic private sector. Small Nepalese towns that followed a “cost-shared, community-based approach to the provision of water supply and sanitation services infrastructure, together with training, awareness campaigns, and institutional development, improved the operational and financial sustainability of water services providers, compared to providers in towns that did not receive this support”.²² These models may be adapted for FSM services. The National Sanitation Policy and Action Plan 2018-22 in Pakistan recognise the role of the private sector for sustainability and efficiency of sanitation services, especially in O&M and also acknowledges their role in capacity building for government officials.

²² <https://m.youtube.com/watch?v=czua7n0ryEY&feature=youtu.be>

4.

FSM at Work

Case Studies

This section presents a summary of the faecal sludge management interventions in the four study cities as described in the Introduction to this report. More detailed case studies can be found as a separate document: **Faecal Sludge Management Landscape in South Asia: Case Studies** (Link: washmatters.wateraid.org/faecal-sludge-management-study-south-asia)

4.1. SAKHIPUR, BANGLADESH

Background

Sakhipur is a rapidly urbanising municipality in Bangladesh. Households use a variety of pit toilets with septic tanks but there is no dedicated sewerage system and limited collection and treatment options. Following an action research project by WaterAid and Practical Action in Faridpur, the municipality decided to build a faecal sludge treatment plant to address the mounting waste problem.

A baseline study and Shit Flow Diagram (SFD)²³ showed that 0% of faecal sludge generated in Sakhipur was safely managed and a subsequent participatory process led to a decision to construct a co-composting plant for faecal sludge and organic solid waste to address the lack of services (PMID, 2015). The commitment to this project was ensured through the leasing of 0.3 acres of land for the plant by the municipality in the outskirts of the municipal area. The municipality also supplied a Vacutug.

Some of the key considerations while planning and designing the co-composting plant were:

- Consideration of scale: Initially the Vacutug was accessible to only 20% of households and so a plan was made to increase accessibility and the capacity of the plant was designed to increase over time.
- Use of a simple, known technology not requiring highly skilled operators: the design was one that the Mayor knew and had confidence in. Energy use for operation should also be low.
- The technology should integrate waste management and produce useable end products especially given that Sakhipur is a vegetable growing area.
- Occupational health and safety measures
- Quality assurance: The strategy was to design the operation to meet the expected quality of the compost. To ensure this, a trial period was carried out.

²³ A shit flow diagram is a tool to help understand and communicate how excreta physically flows through a city. See Annexure 9: Shit Flow Diagram: Sakhipur (pre and post intervention)

Interventions and technology

CAPTURE AND CONTAINMENT

- No changes were made to the way that liquid and solid waste are captured and contained



EMPTYING AND TRANSPORT

- Municipality runs an on-demand desludging service using a 1,000-litre capacity Vacutug
- Service runs 4 days a week collecting around 18,000 litres per week
- A private entrepreneur runs door-to-door solid waste collection for a monthly fee
- The collected sludge and solid waste are delivered to a co-composting plant



- Cost considerations: A willingness to pay survey showed that about 40% of the households in the municipality were willing to pay between BDT 1 to 200 per month for faecal sludge management services²⁴.
- Special consideration of service charge for poor households whereby they pay only for the fuel

Institutional Responsibility

The municipal authority played a significant role in realising their need for FSM and worked closely with WaterAid Bangladesh and its partner, the Bangladesh Association for Social Advancement (BASA). WaterAid provided technical and financial support and BASA worked as the implementation partner. The municipality supervised various components such as the collection of faecal sludge, conservancy, billing and tariffs. A management committee was formed for the operation and maintenance of the

plant, which included the mayor as the advisor, members from municipality, BASA and professional representatives, though O&M is currently carried out by WaterAid Bangladesh along with some staff employed by the Municipality.

Financial and Business Model

- Plant construction was financed by WaterAid Bangladesh and did not use any public funds.
- Resources provided by the municipality include the approach road, land, desludging vehicle, and tariff collection for desludging services.
- An account operated by the municipality manages the fees collected from sludge and solid waste collection and the sale of compost. The Vacutug O&M and salary of 2 staff are paid out of the account.
- The sorting of the solid waste was the costliest activity contributing to approximately 30% of the total O&M cost.

²⁴ The willingness to pay survey is included as Annexure 3

TREATMENT



DISPOSAL/ REUSE

- The treatment plant is an unplanted drying bed constructed with locally available technology. This became operational in January 2016 starting with a 6-month trial period
- The plant has a capacity of 8,000 litres per day and requires 14 days per cycle
- Local farmers use the compost produced by the plant as a soil conditioner
- Department of Agricultural Extension has provided further technical guidance for reuse and distribution to farmers

This has now been taken on by a private entrepreneur.

- Around half of the income for the plant comes from tariffs and the other half from compost sales.
- The plant operations are yet to be financially sustainable.

Successes and Lessons Learnt

- Increased proportion of faecal sludge produced that is safely managed from 0% to 43% from 2015 to 2018.
- Increased evidence and learning on FSM in small municipalities in Bangladesh.
- Political commitment to FSM demonstrated through the provision of land.
- All elements of the sanitation chain are addressed including reuse.
- Planning and implementation was done in phases and the technology chosen was such that it could be designed in a

modular fashion, opening more drying beds as coverage increased.

Remaining Challenges

- It has been difficult to create demand for a new service though the continuous advocacy and use of participatory approaches has made some progress.
- The Vacutug cannot access many areas in the municipality meaning that some residents have to use manual emptying services.
- The location of the plant is quite far from the city, and contributes to higher transport costs, thus impacting the financial viability.
- The social stigma and unacceptance of unfamiliar approaches around faeces and their reuse still needs to be addressed.
- The ability of the municipality to sustain services after WaterAid exits remains a challenge.

4.2. LAKSHMIPUR, BANGLADESH²⁵

Background

Lakshmipur has a population of 150,154 (2018 figure)²⁶. The predominant on-site sanitation systems are pour-flush latrines with direct and off-site pits (60%) and toilets connected to septic tanks with or without soakage pits (35%). When pits and septic tanks are emptied, sludge is disposed of in drains, dug holes, or open land without any treatment. There are limited arrangements for centralised sludge collection, treatment and disposal (FSM Network, 2016).

The commitment of the Mayor of Lakshmipur played a vital role in successfully building a faecal sludge treatment plant (FSTP) under the Secondary Towns Water Supply and Sanitation Sector Project (STWSSP).

Based on secondary reports²⁷, key considerations for planning and designing were:

- Elimination of dumping of septic tank sludge into the environment
- Low cost and locally available technology
- The treatment plant should be simple to maintain
- Improvement of public health
- Size of land available
- Minimum external energy usage
- Enhancing solids retention in septic tank to reduce accumulation of solids in the drainage system
- Potential in the future for producing dewatered sludge that could be used as manure in agriculture

Interventions and technology

CAPTURE AND CONTAINMENT

- No changes were made to the way liquid and solid waste are captured and contained



EMPTYING AND TRANSPORT

- Municipality run an on-demand desludging service using 3 Vacutugs
- Training provided for sweepers and pit emptiers by the local manufacturers of the Vacutugs
- Vacutugs serviced every 3-5 months
- Municipality supervises sludge collection, conservancy, billing and tariff setting and collection

²⁵ Availability of secondary information was limited

²⁶ Source: Pourashava

²⁷ No baseline planning study could be made available by the DPHE during the course of this research so the planning process is not very clear

During the project, there was an advocacy campaign to encourage people to desludge run by the Pourashava using audio campaigns, advertisement on local television etc. and this helped to popularise the initiative.

Institutional Responsibility

The Department of Public Health Engineering (DPHE) was the executing agency and handled overall technical supervision and execution of the project. DPHE established a Project Management Unit (PMU) to provide technical support, manage the day-to-day operations, and coordinate with the Project Implementation Unit (PIU) which coordinated with relevant district level bodies. A water supply and sanitation committee had been set up under the Pourashava mayor to oversee the interventions. All development works were

discussed at a 50-member citizen forum called Town Level Coordination Committee (TLCC) and implementation progress is also monitored by them.

Financial and Business Model

- The cost of plant construction and technical assistance was provided by the project but the operation and maintenance cost is now borne by the municipality.
- The municipality are responsible for tariff collection and for the desludging services.
- The service charge collected per week is about USD 70-80 and USD 18,500 was collected from customers since the beginning of the operation of the plant.
- The operation and maintenance cost of the Vacutug is stated to be around USD 15 per week²⁸, the main cost being fuel.

TREATMENT

- The treatment plant is a 780m² planted sludge drying bed using vegetation that is tough, adaptable, tolerant to low oxygen levels and locally available
- This plant has a high dewatering efficiency and requires minimal maintenance
- No electricity required for the plant to operate



DISPOSAL/ REUSE

- The liquid effluent generated from the plant is reported to satisfy the national discharge standards and is discharged into the open environment (Rahman, et. al., 2015)
- Dried sludge produced from the beds does not require further treatment before disposal

²⁸ Conversation with Engineer, does not take into account depreciation cost, and other servicing costs

- A business model for the FSM operations is not developed²⁹ and there are no plans to enhance the efficiency and coverage of FSM services and performance of the treatment plant due to lack of external funding³⁰. It is difficult to assess the financial sustainability of the model, given the lack of information.

Successes and Lessons Learnt

- The Mayor's commitment to the construction of the treatment plant was manifested through providing access and land for the project and was key to its success.
- The involvement of both DPHE and the municipality along with a strong Town Level Coordination Committee to settle disputes helped to coordinate the project.
- The project was a federal government initiative and is still being run successfully by the municipality.
- The technology selected is appropriate for scaling up but would require enhanced capacity within the municipality for operation and maintenance to ensure city-wide service delivery.

Remaining Challenges

- Vacutugs cannot access difficult areas which affects coverage and service levels. The demand is low, with average of one trip/day and operation 2 days/week due to lack of strategic demand creation.
- Spare parts are not available locally for Vacutugs procured during the project³¹.
- There is currently limited performance monitoring of the plant and thus no evidence of the performance of the treatment system.
- No consideration to date of reuse due to social stigma surrounding reuse of dried sludge.
- Municipality staff do not have the necessary skills to sustain FSM interventions.

²⁹ Although the STWSSP had a financial analysis done together with water supply operations for 20 years of operation (not disaggregated)

³⁰ Based on conversation with the Pourashava officials. Looking for another project (external funding) for furthering the FSM services, maintenance and performance of the treatment plant, and also reuse options.

³¹ Conversation with Vacutug operator

4.3. WARANGAL, INDIA

Background

Warangal city is the second largest city in the newly formed state of Telangana, India³². It is the first city in India to introduce and implement Faecal Sludge Management (FSM) regulations.

A detailed survey conducted in 2015 revealed low service levels, evidence of open defecation, lack of adequate and inclusive toilets and no regulatory guidelines for the disposal and management of septage. Septage was disposed of in fields or outfall drains (V. S. Chary, 2017). According to the Warangal Shit Flow Diagram (SFD) conducted in 2017, 42% of waste was being safely disposed of or reused and 58% waste was not being treated. Due to intense work through the Swachh Bharat Mission, Warangal was declared Open Defecation Free (ODF) in 2017. It also achieved ODF ++³³ status in January 2019 but the lack of treatment of sludge became a priority.

Elements considered in planning were:

- Aspirational technologies: leadership keen on innovation
- Availability of land
- Compliant with the environmental norms as per the relevant legislations.

Institutional Responsibility

In 2015, ASCI set up a small Technical Services Unit (TSU) for implementing “City Wide Delivery of Sustainable and Equitable Sanitation Services in Warangal” with the support of the Bill and Melinda Gates Foundation (BMGF) and the UK Department for International Development (DfID). Initially the focus of the TSU was to primarily aid the city on Individual Household Latrine implementation as part of SBM. Under this same project, a state level Project Management Unit (PMU) and city level Project Implementation Unit (PIU) were also set up within Greater Warangal Municipal Corporation (GWMC) in 2017.

A non-sewer sanitation (NSS) cell was established in 2018 at the state-level to manage and operationalise NSS in 72 cities. Additionally, a City Sanitation Task Force comprising multiple stakeholders including civil society groups was established for dialogue and participation by the GWMC³⁴.

In 2018, a Sanitation Innovation Hub was approved by the GWMC. The aim of the Hub is to promote innovation, test new technologies, encourage collaboration and thus develop an ecosystem of innovation and private sector players in the non-networked sanitation sector.

³² 2011 census population of all merged 42 villages is added to core city, CSP, GWMC, 2011, pp19

³³ A city / ward / work circle can be notified/ declared as SBM ODF++ if, at any point of the day, not a single person is found defecating and/ or urinating in the open, all community and public toilets are functional and well maintained, and faecal sludge/septage and sewage is safely managed and treated, with no discharging and/or dumping of untreated faecal sludge/septage and sewage in drains, water bodies or open areas

³⁴ City Sanitation Plan. GWMC, 2018

Interventions and technology

CAPTURE AND CONTAINMENT



EMPTYING AND TRANSPORT



- Regulations adopted on septic tank designs and construction methods
- Conversion of insanitary latrines into sanitary latrines
- Masons trained in toilet/septic tank construction
- Integration of a technical assistance helpline for latrine construction

- Periodic de-sludging introduced alongside an advertisement campaign
- Formal process introduced for licensing of desludging operators and their trucks which are fitted with GPS
- Market-determined user fees for desludging
- Detailed data collected on septage generation

Financial and Business Model

- Based on learning from the private operators, a business model has been developed to scale up at city and state level in order to encourage innovative technologies and private players in the sector.

Successes and Lessons Learnt

- The approach has informed several state level policies and directives that contribute to an enabling environment for FSM throughout the state of Telangana and other states.
- Compelling evidence, gathered through the diagnostic study and SFD and disseminated widely, helped to build public consensus on the importance and urgency of FSM services which added to existing political commitment.

TREATMENT



DISPOSAL/ REUSE

- 2 treatment plants constructed:
 - Geobags: non-mechanical technology that dries sludge with effluent collected and treated in a STP
 - Thermal treatment plant: uses anaerobic stabilisation and unplanted drying beds. Liquid effluent treated by DEWATS
- By-products, such as bio solids, can be reused in agriculture
- Treated water can be used for irrigation
- These disposal options are approved by the Government of India

- There was active support of desludging operators, who welcomed regulations and requested city government to prioritise faecal sludge treatment plants, and also were at the forefront in tariff discussions.
- A regulatory framework covering the entire sanitation value chain was developed in 2016 to promote a comprehensive and integrated approach to FSM and septage management.
- Based on performance of existing two FSTPs, the City has committed to scaling up the treatment plant to a capacity of 150 kilolitres/day³⁵. Land has already been identified for this.

Gaps and Challenges

- The technology selection process and allocation of land could have been done earlier in the process to ensure desludging operators have a designated place for disposal and treatment.
- The FSTP is located 20 km beyond city limits. Suitable land parcel/s closer to the market are likely to enhance compliance and the financial viability of the initiative.
- There is a lack of committed technology providers with solutions that cover design, build, maintain and transfer.

³⁵ Source: discussion with Dr. Chary- director of ASCI

4.4. GULARIYA, NEPAL

Background

Gulariya Municipality is located in mid-western Nepal. It became a municipality in 1995 and was restructured in 2015. The municipality was declared an Open Defecation Free Zone in April 2014. 88% of households use pour flush toilets with a single pit and 9% use pour flush toilets with a septic tank (ENPHO, WAN, 2017). Currently, it offers mechanised emptying, transportation and treatment facilities.

A Faecal Sludge Treatment Plant (FSTP) was constructed in 2016 as a post ODF initiative in the region with an aim to sustain ODF status and as part of a technology demonstration project. Management of faecal sludge was a major issue raised by communities during the ODF campaign and concurrently the municipality were discussing development of a landfill site

and experts recommended that both liquid and solid waste treatment could be combined in a common site with the aim to produce compost from faecal sludge and solid waste.

The municipality organised the land for the treatment plant through a partnership between the municipality, project and Sarju Community Forest Users Group (SCFUG) who agreed to provide land for the plant in the community forest. The focus was on implementation as a showcase project, not as a sustained service delivery mechanism, and so no formal planning process was followed.

Institutional Setup

A Project Management Committee (PMC) was formed with responsibility to oversee and guide project implementation and enhance ownership of the initiatives to

Interventions and technology

CAPTURE AND CONTAINMENT

- No changes were made to capture and containment



EMPTYING AND TRANSPORT

- Locally improvised desludging transport vehicle was developed to access difficult to reach areas but had bad performance so a suction vehicle was purchased
- Municipality collects solid waste and carries out desludging on demand
- Demand for services remains low and is restricted to the core urban cluster



improve long term sustainability and continuity of activities. The monitoring of the construction was done through progress reporting to the PMC.

Although the plant is managed by SCFUG, the Municipality oversees operation and maintenance (O&M), responsible for carrying out daily O&M of both the solid waste treatment unit and the faecal sludge treatment unit (both on the same site). The supervisor was appointed from the Sarju Community Forest User Groups as part of the informal commitment made by the municipality.

Financial and Business Model

A draft business plan was developed by the project to ensure cost recovery for O&M of the system and it estimated a net profit to be generated through desludging services and selling of organic fertilizer. However, the revenue generated is lower

than the estimate due to higher labour cost (more staff employed than estimated), low desludging demand, and the fact that no organic fertilizer has been produced.

Successes and Lessons Learnt

- A partnership between municipality, project and Community Forest Users Group (CFUG) based on a benefit sharing model was key to ensuring the project's success.
- The municipality has developed a partnership with WASH Finance Project³⁶ with the aim of scaling up services in the city through social mobilisation for creation of demand, developing a Standard Operating Procedure (SOP) for SWM and FSM, reviewing the draft business plan and adding necessary improvements to develop sustainable plans to operate integrated FSM and SWM.

TREATMENT

- DEWATS with 7 sludge drying beds, a settler and anaerobic baffled reactor and a planted gravel filter
- A flood in the initial year of operation clogged the filter media and efficiency of filter has reduced due to lack of maintenance



DISPOSAL/ REUSE

- DEWATS designed to produce organic fertilizer from dried sludge to generate revenue but there has been no testing so it has only been used on site

³⁶ WASH-FIN is a five-year program financed by the United States Agency for International Development (USAID) implemented by TetraTech

Gaps and Challenges

- The demand for FSM services is limited and even where it exists, accessibility of the faecal sludge truck to many areas remains an issue, leading to unsafe disposal of sludge.
- The FSTP was not contextualised during design to take into account the flood risk in the area or the projected population growth.
- If co-composting is to be done, the compost site needs to be redesigned with a segregation mechanism established and more training must be done with staff.
- The need for improved skills and for standard operating procedures for SWM and FSM services has been realised by the municipality. Technical assistance from ENPHO helped the municipality to build the plant but transfer of knowledge was inadequate (only basic training was provided).

4.5. COMPARATIVE ANALYSIS OF FSM CASE STUDIES

The case studies presented in this report cover a multitude of experiences within FSM. Whilst in Warangal, the projects included the conversion of insanitary toilets to sanitary ones and improvement of the septic tank design, most technology-based interventions were focused at the later stages of the sanitation value chain (a reed-based sludge drying and filter bed system (Lakshmipur), unplanted drying beds (Sakhipur), Geobags and thermal treatment (Warangal)). To help create demand and awareness of FSM services, a customer helpline was introduced in Warangal. In Sakhipur and Warangal, campaigns were carried out using a range of media to encourage social mobilisation.

In Sakhipur and Warangal, there were several innovations which targeted policy and the enabling environment for FSM such as the formalisation of regulations, registration of operators, capacity building of masons, safety training and strengthening of the municipality including improving their data collection systems. These two case studies also looked at the private sector, developing business models for FSM which included marketing of reuseable end products. In Warangal, they also used the investment in innovative technologies to try to build a private sector ecosystem.

In most case studies, there was investment in collection technologies and some looked at innovative reuse options such as eco-friendly bio char, and co-composting.

Amongst this breadth of experiences this section identifies key findings, common strengths and remaining challenges from the four case studies.

KEY FINDINGS

Political Leadership

In all case studies, the role of political leadership was important in initiating the processes for faecal sludge management. Introduction to national and international good practices through exposure visits led to confidence building and awareness of FSM operations. Funding and technical assistance was in each case provided by external agencies whether the projects were aimed at technology demonstration (Gulariya, Lakshmipur) or city wide safe sanitation (Warangal, Sakhipur). In the case of Sakhipur and Lakshmipur, the initiative to access the funding came clearly from the political leadership and in case of Gulariya and Warangal, the political leadership was coopted into an externally initiated project. These external agencies had previous relationships with the municipalities and could therefore encourage the authorities in their understanding of the importance of FSM interventions. This was done through identifying a common agenda (waste challenge in Sakhipur and Gulariya), political aspirations (Lakshmipur and Sakhipur), demand from the citizens (post ODF challenge, Gulariya) or setting the ODF+ agenda for Warangal.

Evidence-based Advocacy

Evidence-based advocacy through diagnostic studies, SFDs, sanitation plans and other studies, provided the basis for establishing the agenda and bringing public

visibility (Sakhipur, Warangal, Gulariya). For sustained awareness Information, Education and Communication (IEC) campaigns for FSM services were conducted using different mediums (pamphlets, hoardings, advertisements, focussed citizen awareness campaigns, informing citizens as they approached the municipality for different services, etc.).

Partnerships

Stakeholder engagement and establishing of partnerships was a key strategy noted in all the cities. Due to stakeholder buy-in right from the start, many hurdles could be overcome during the process of implementation. For example, the partnership model in Gulariya helped them secure land for FSTP and operators became involved in discussions with the authorities on things like tariff discussions in Warangal.

Planning Approaches

Three different city planning approaches were used in the case studies:

1. A city-wide planning process aimed at linking all aspects of the sanitation value chain for sustained service delivery - Sakhipur
2. A city-wide planning process aimed at formalising regulations for FSM and developing enforcement and monitoring strategies for sustained service delivery - Warangal

A common element of these first two approaches was linking the sanitation value chain with phase wise planning and implementation and proving technology outcomes before scaling up.

3. Planning focused on implementation of a demonstration technology (Gulariya).

Lakshmipur was also a technology demonstration project where DPHE did the planning and execution, with much less involvement from the city.

Choice of Technology Varied with Local Priorities

Most cities looked at technology options that were low cost, low maintenance and with low resource requirement and that had options for re-use. In Warangal however, the focus was on innovative solutions and so private players (Tide Technocrats and Banka BioLoo) were encouraged to demonstrate the performance of their technologies with scheduled desludging to begin soon. In Warangal and Sakhipur, importance was given to the quality of the treated product and the process therefore had several iterations. The experience with the private sector in Warangal has informed the State in requesting proposals from technology companies on an innovative PPP model for establishing FSTPs in 72 cities in the State of Telangana.

Financial and Business Models

In all the study cities, there were focused funding arrangements, either a project grant for a limited period to demonstrate a technology (Lakshmipur and Gulariya) or I-NGO/Foundation funded grants. No public funds were used for development of the FSTPs, although municipality resources in the form of land, access roads, transportation trucks, and facilitation were made available in many cases. Since all of them were project based, financial planning for FSM services were not done initially. Three cities went on to develop business plans including an innovative PPP arrangement in Warangal.

COMMON SUCCESSES

Leadership and ownership was shown by the urban local body/city authorities in each of the study cities, manifested through provision of land (all cities), desludging trucks (Gulariya, Sakhipur) and involvement in the operation and maintenance of the plant (Gulariya, Sakhipur, Lakshmipur). The Gulariya FSTP in Nepal helped to create greater awareness and more confidence among municipal authorities about safely managed sanitation and treatment options. The municipality now plans to invest in city-wide service delivery by increasing plant capacity, creating citizen awareness to ensure sustained demand for desludging, and building capacity of staff involved in management.

It is commendable that the FSM interventions either initiated and/or implemented by the cities as part of this study were initiated even before the enactment of FSM policies/framework of the study countries which came out in the 2017 time frame. Establishing institutional mandates was seen to be key for operationalising interventions and establishing ownership by the city. The non-sewer sanitation cell (Warangal) or project committees (Gulariya, Sakhipur) became important structures to facilitate implementation. In each case, efforts were made to address the rights/entitlements/duties of both rights holders and duty bearers to improve accountability and transparency.

COMMON CHALLENGES

All cities had difficulties in ensuring coverage of services to everyone within the city who wanted them especially the poorest in hard to reach areas.

None of the cities have yet produced a proven business plan for the running of the services and no FSM service is currently profitable or financially sustainable. This is a major challenge for FSM. One of the areas of weakness was in creating demand for the end product where compost was being produced. Without the market in place, it is not possible to collect revenue and this makes the process unviable.

Whilst a lot of capacity building was done with all stakeholders but particularly municipality staff, there remains a lack of skills to independently operate and maintain the services put in place by these projects. This has an impact on monitoring which is also weak and means that there is limited information available about performance of the technologies.

5.

General Conclusions and Recommendations

5.1. CONCLUSION

At the national level of the study countries, the enactment of FSM and FSSM policies and an institutional and regulatory framework have been given the due importance of FSM as a sub-sector in three out of the four countries. These policies are ambitious, providing institutional mandates, improving the separation of roles and encouraging the role of the private sector. This has further encouraged multilateral agencies, donors, and respective countries to recognise FSM investments as part of overall sanitation investments. The ongoing efforts to improve coordination, clarify responsibilities and identify emerging funding mechanisms for FSM are positive developments. Pakistan is yet to have an FSM Policy and the results of this are reflected in the lack of current FSM projects in the country. Pakistan does however have the political commitment through Vision 2025 and a sector-wide integrated approach.

However, the major gap, remains the translation of these policies into practice, especially in Nepal and Bangladesh. India has made some progress with 22 FSTPs constructed, and 10 in progress. Multilateral agencies, development partners

and foundations have been supporting and working closely with its partners in South Asian countries assisting with piloting innovative and appropriate FSM interventions that can be scaled up and replicated in the region in future. Moreover, country-specific alliances and task forces for FSM have been key drivers in generating evidence, technical guidance, and building up the political commitment towards FSM, as the post ODF agenda.

There is a trend towards decentralisation with the responsibility of FSM implementation in all the countries rests with the state/provincial governments and the city governments. However, resources, human, technical and financial are inadequate to take up this huge challenge, especially for the small and medium-sized cities. Many of the policies lack clarity in the roles and responsibilities of the different agencies involved. Lessons from Warangal in establishing regulations, enhancing capacity to deliver accordingly, creating a citizen interface with the municipality and creating monitoring systems using technology in enforcing the regulations could be explored for

other contextual application. Setting up Project Committees in Gulariya (Nepal) and Sakhipur (Bangladesh) has also been helpful in getting interventions implemented and ensuring accountability and transparency.

Leadership and commitment (political and bureaucratic) played a key role in initiating the push towards FSM from ODF. Both national and local level political commitment is essential for the progress of this sector. National level commitment has been demonstrated through FSM policies and frameworks (Nepal, Bangladesh, India), funding allocation (Bangladesh) and addressing FSM in a Sub-Mission mode (India). Ownership was shown by local authorities through the provision of land (all cities), desludging trucks (Gulariya, Sakhipur), and also involved in operations and maintenance of the plant (Gulariya, Sakhipur, Lakshmipur). Moreover, city level interventions (Warangal) are informing state policies, as in the case of Telangana and Andhra Pradesh in India.

Whilst support from the national government for the systematic inclusion of non-sewered sanitation in policy was a key driver in India, in Bangladesh, evidence and on-ground experience from city authorities informed and contributed to the development of the IRF. This shows that both top down and bottom up approaches can drive advancement in FSM.

Despite these promising changes to the policy landscape and coordination mechanisms, the budget allocation for FSM services still remains low. Financial resources allocated from government budgets have been meagre (Bangladesh),

or no disaggregated evidence of allocations (India). Currently, most of the FSM interventions are based on technical and financial assistance from external agencies (I-NGOs, foundations, development partners, academic, and research institutes). Thus, there exists the possibility for efforts not being scaled up as priorities change and/or when programmes and funding ends. Learnings from the innovative operational models that are emerging may help in drawing out operational models for scaling up, with a clear accountability mechanism of the actors with respect to quality service delivery. Also, the private sector plays an important role in capacity building for the sector, in terms of technical skills as well as the advancement of technological options and service delivery.

Development partners, academia and multilateral agencies have made a huge contribution in terms of both financial and technical resources in aiding FSM discourse and implementation particularly through evidence-based advocacy. Collaborative efforts like the FSM Network in Bangladesh and NFSSM Alliance in India are playing an increasingly important role in driving the discourse and de-mystifying the risks (often decision makers are averse to new approaches and risks). FSM policies/ frameworks have enunciated a clear role for the private sector, although the role is quite limited given incentives and rate of return on investment is not lucrative enough. Modalities for incentives, the role of regulatory mechanism and sharing of risks between the players are still unclear and need to be worked out by the respective governments. However, several pilots are in

place in the study countries and learnings from the models may help in drawing out models for scaling up, with a clear accountability mechanism of the actors with respect to quality service delivery.

FSM policies and experiences on ground create opportunity for scaling up in the respective countries informing scientific and practical knowledge on the technical and operational aspects, regulations, planning processes, estimation of resource needs, technology options and reuse potential and socio-economic aspects of reuse of faecal sludge. The technologies selected are mostly appropriate for scaling up. However, the whole FSM value chain needs to be considered to ensure quality service delivery and also sustainability of the treatment system. The GWMC case supports city-wide sanitation improvements with a view to mainstream FSM through strengthening of the enabling environment. This was done through targeted capacity building for implementation, establishing institutional mandates (NSS cell), strengthening of the NSS, using an inclusive approach (S line, SHE Toilets, worker safety program) and promoting aspirational technologies. The evidence for the success of this approach is shown in directives for cities to scale up FSTPs, a state-wide request for proposals for FSTPs covering 72 ULBs, and formulation of the state FSM policy.

5.2. REMAINING CHALLENGES

Regulatory mechanisms: Monitoring and regulatory mechanisms are inadequate and regulatory capacity is weak meaning that there is little enforcement of regulations that already exist (see Annexure 8). This is particularly true for the transport, treatment and reuse aspects of the sanitation chain. There is a need for capacity building in FSM at a macro scale but also in the management and regulation of FSM services at city and town level.

Financial sustainability: This came up as a key challenge at both the macro and micro scale. The FSM initiatives are yet to be financially sustainable but also the FSM budget provision is still very much reliant on externally funded initiatives. Financial resources needed to meet FSM targets far outweigh what governments can fund through their own resources. Currently, in all the study cities, there was focussed funding arrangements, either a project grant for a limited period for demonstration of a technology (Lakshmipur and Gulariya) or I-NGO/Foundation funded grants. No public funds were used for development of the FSTPs, although municipality commitments in the form of land, access road, Vacutugs were made.

Capacity to deliver FSM: With the devolution of responsibility of FSM to city governments, the responsibility of FSM implementation in all the countries rests with the state/provincial governments and the city governments. However resources, human, technical and financial, are inadequate to take up this huge challenge, especially in small and medium-sized cities.

Private sector participation: All countries in their policies have enunciated a clear role for the private sector, although the role is quite limited, given incentives and the rate of return on investment is not lucrative enough. Modalities for incentives, the role of regulatory mechanism and sharing of risks between the players are still unclear and needs to be worked out by the respective governments. There is also a lack of committed service providers for FSM service delivery.

Mainstreaming gender and social inclusion (GESI): Institutional framework, guidelines and action plans for GESI with dedicated resources in FSM interventions is still absent with the case studies revealing very little about consideration of these elements. The rights and health and safety of sanitation workers was addressed to some extent in Bangladesh with the introduction of registration and monitoring of FSM operators.

5.3. RECOMMENDATIONS

This last section gives some recommendations based on the evidence gathered throughout this study.

1. Leverage momentum through

advocacy: It is important to sustain the momentum on political commitment towards FSM through continuous evidence-based advocacy. Collaborative platforms are emerging which have the potential to guide policy and resources. Thus, there is a need to sustain these platforms and nurture collaboration towards a common goal.

2. Explore financing mechanisms for FSM including support to the private sector:

Given the scale of the issue, public funding is imperative. Financial resources through programme convergence mechanisms other than direct grants and subsidies need to be explored. Encouraging private sector into this sector will be vital, and thus policies and incentives that cater to hassle-free entry to this market is needed with clear monitoring and enforcement mechanisms in place. There is thus a need to develop the ecosystem for committed private sector service providers. Organisations responsible for industry policy and promotion, technology and process development should encourage start-ups and innovations (technology, and service delivery) in this sector. To sustain FSM service delivery operations, innovative business models need to be piloted and scaled up including strategies for demand creation as well as the marketing of any end product.

3. Robust planning with some quick

wins: Politicians and stakeholders need to be motivated enough to champion the FSM cause. As more cities are recognising the need for FSM, and the fact that there is “no one solution that fits all”, there is a need to have evidence-based planning for FSM. Currently, data collection processes, infrastructure and systems that capture and analyse data for FSM is poor, and need to be ramped up to ensure pertinent policy and design interventions. The planning process

should also enable some quick wins (regulations, Vacutugs, Treatment Plant) aimed at “de-risking” the interventions. A recommended robust yet pragmatic planning process is shown in Annexure 11.

4. Develop and enforce regulations in tandem with considering technologies:

There is a need to develop regulations that pertain to clear procedures, permits and licenses, tariffs and penalties that will be monitored and enforced. Immediate priority should be: a) safe collection and transport, b) disposal standards for faecal sludge effluent and sludge and, c) monitoring mechanisms. Regulatory mechanisms that incentivise partnerships between the public, community and private sector to achieve quality services need exploration. Important that designated safe disposal sites or treatment technologies should be in place for regulations to be enforced.

5. Use flexible management structures:

As countries move from policy to implementation at scale, innovative management structures that are flexible, yet coordinated and maintain their mandate become key and mitigate bureaucratic hurdles. A dedicated decentralised FSM Cell with enhanced institutional and organisational capacity is vital to sustain development and innovation in the sector. Moreover, external platforms (NFSSM Alliance, FSM Network, etc.) play a key role in providing guidance to the FSM Cell, city authorities and utilities.

6. Build technical and institutional capacity:

There is a need for a multi-pronged approach so as to best cater to the capacity needs of multiple stakeholders (municipalities, utilities, service providers, contractors, building inspectors, masons, consultants) with varying degrees of skills and training requirements (safety, procurement, contract management, financial, etc.). Vocational training institutes and local academic institutions could be approached as sources of support and assistance with capacity development initiatives. The programme needs to be conceived within a larger roadmap to strengthen local governments, including a clear role of states in supporting capacity building, with budgetary support.

7. Consider a variety of technologies:

A technology agnostic approach is recommended taking into account the local context, resource availability, and the market for any reuse of end product.

8. Prioritise inclusivity:

There is a need to understand better the interplay of issues of gender, social inclusion, safety, security and rights of sanitation workers in the context of FSM, so as to ensure appropriate action for equitable services both at policy and practice level. Guidelines that cater to on ground inclusive processes and perspectives need to be developed and mainstreamed into the planning process in cities.

9. Institutionalising community

engagement: The foundations made by different participatory approaches (SBM, WATSAN and WSUCs) in community engagement need to be nurtured for replication and scaling up, especially to raise awareness and social mobilisation towards demand creation for FSM services.

10. Consider reuse of treated faecal

sludge: Faecal sludge as a valuable product need to be marketed with thorough evidence and advocating a favourable policy for the same. Further, creating viable business opportunities using faecal sludge as a valuable product could help to address the sanitation challenge, offer environmental benefits in terms of organic fertiliser and generate revenue.

6.

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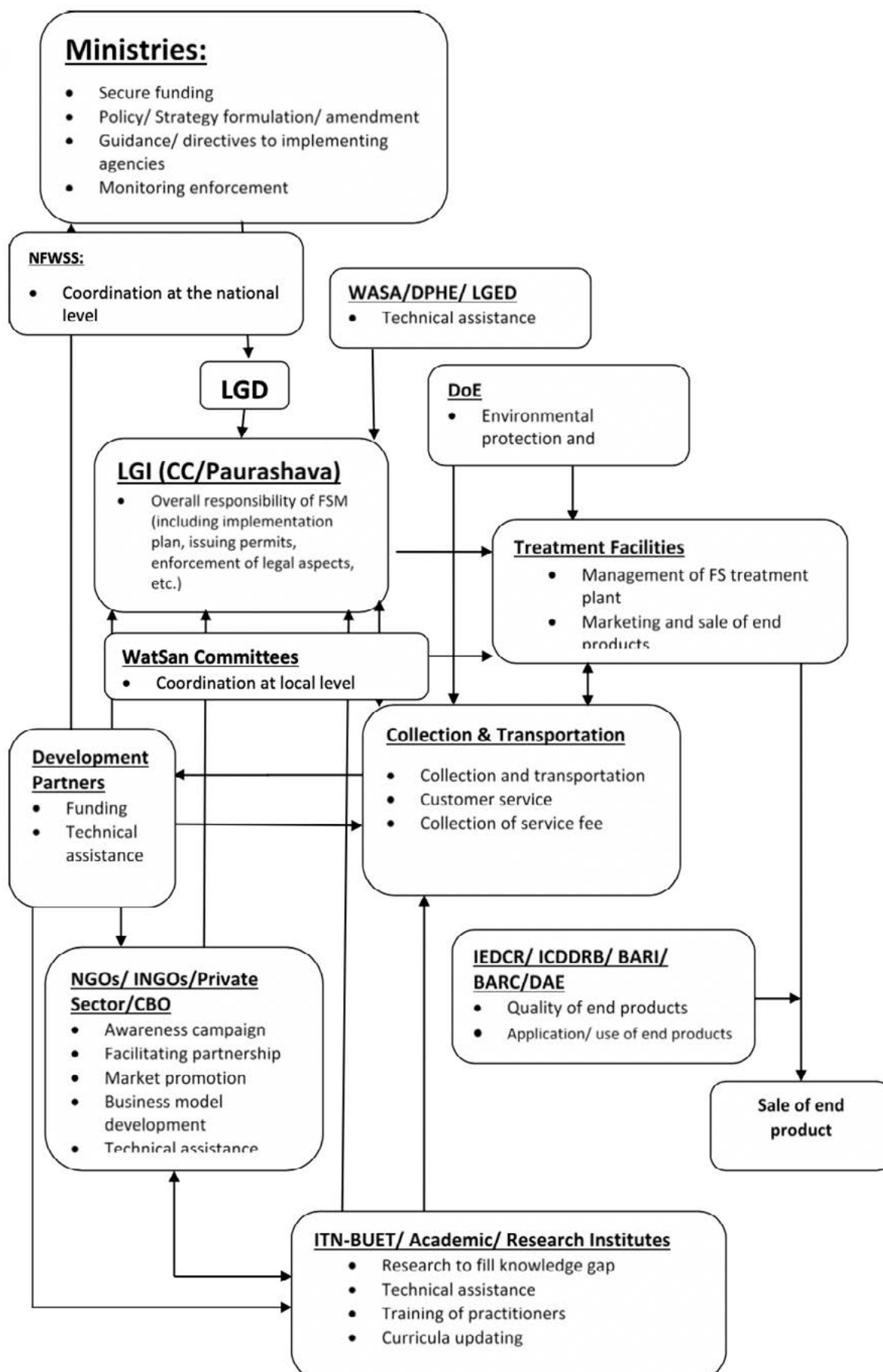
7.

Annexures

7.1. ANNEXURE 1: Existing FSTPs in Bangladesh

City	Population (millions)	Capacity	Area	Production capacity	Cost (million/year)	Funded by	Type of technology used
Lakshmipur			0.3 acre			GoB and ADB (DPHE)	
Sakhipur, Tangail	0.032	Sludge 6 m ³ /day	0.3 acre	Compost 24 tons per year (Muyeed, et al., 2017)	BDT 0.8	WaterAid	Co-composting
Faridpur	0.12	24 m ³ sludge/day	1.5 acres	Compost 100 tons per year (Practical Action Bangladesh, 2018)		BMGF	Aerobic digestion followed by sun drying
Satkhira	0.095	2 m ³ /day	10 decimal	15 tons dried sludge per year (DPHE)	BDT 1 million	Practical Action	Unplanted drying bed, solar drying system, anaerobic digestion
Kushtia	0.083	9 m ³ / day		Compost around 848 ton/year (200 m ³ /month) (Enayetullah, et al., 2013)		Waste Concern	Co-composting
Khulna	1.5	270 m ³ / day	1 acre		BDT 15	SNV (CSE, 2018)	Planted drying bed: 6 units Unplanted drying bed: 6 units
Jhenaidah	0.16	36 m ³ / day	2.4 acres		BDT 8	SNV (CSE, 2018)	Planted drying bed: 5 units Unplanted drying bed: 3 units
Sirajganj	0.3		1 acre			GoB and ADB	

7.2. ANNEXURE 2: Institutional framework regarding FSM in Bangladesh



7.3. ANNEXURE 3: Willingness to pay for better faecal sludge management service

During the baseline survey, households were asked to give suggestions to improve the faecal sludge management situation in the municipality and their willingness to pay for faecal sludge management services. About 40% of the respondents were willing to pay between 1-200 BDT per month for desludging services. Majority of the respondents had no suggestion or idea to improve the current practice and situation of faecal sludge management in the municipality. Only few respondents provided suggestions for improvements like using vacuum tanker, using compost plant or transfer to other location for treatment and disposal, etc.

Willingness to pay per month (Tk.)	Frequency	Percentage
Nil	165	61.11
1.0	7	2.59
2.0	9	3.33
3.0	2	0.74
5.0	1	0.37
10.0	11	4.07
15.0	5	1.85
20.0	24	8.89
25.0	3	1.11
30.0	15	5.56
35.0	2	0.74
40.0	3	1.11
50.0	13	4.81
100.0	6	2.22
150.0	2	0.74
200.0	2	0.74
Total	270	100

7.4. ANNEXURE 4: India – Institutional roles and responsibilities for FSM

Lead Role	Supportive Role
Ministry of Housing and Urban Affairs	
<ul style="list-style-type: none"> Formulation of policies, strategies and guidelines Financial assistance to states to develop urban sanitation schemes Through CPHEEO provide technical and planning support to states and ULBs 	
Ministry of Social Justice and Empowerment	
<ul style="list-style-type: none"> Strive towards elimination of manual scavenging and rehabilitation of manual scavengers Monitor and evaluate progress at the National Level National level awareness campaign 	<ul style="list-style-type: none"> Help States and ULBs eliminate manual scavenging and rehabilitate manual scavengers

Lead Role	Supportive Role
Ministry of Women and Child Development	
	<ul style="list-style-type: none"> Gender mainstreaming of IEC material for FSSM across the country
State Governments	
<ul style="list-style-type: none"> Develop State level FSSM Strategy and Implementation Plan Develop Operative Guidelines on FSSM Training and capacity building of ULB officials and others engaged in provision of FSSM services State level awareness and behaviour change campaign Create enabling environment for participation of the private sector, NGOs and CSOs in provision of FSSM services including to the poor and marginalised households and areas Funding through specific schemes and plans Support research and capacity building in the sector State level monitoring and evaluation 	<ul style="list-style-type: none"> Technical, financial and administrative support to ULBs Encourage coordination and cooperation among ULBs Regulate and help ULBs set up systems to ensure financial sustainability in provision of FSSM services Implement municipal by-laws
Urban Local Bodies	
<ul style="list-style-type: none"> Design, develop, plan and implement ULB level FSSM strategy Set up and ensure operation of systems for 100% safe and sustainable collection, transport, treatment and disposal of faecal sludge and septage Develop expertise, in-house and outsourced, to provide safe and effective FSSM services Awareness and behaviour change campaign to engage diverse stakeholders Develop training programmes for masons to build requisite skills in construction of quality septic tanks as per BIS / NBC norms Set up systems to ensure financial sustainability in provision of FSSM services Achieve objectives of FSSM Policy in a time-bound manner Design and implement plans to eliminate manual scavenging and rehabilitate manual scavengers Funding through specific schemes and plans Monitor and evaluate FSSM strategy and implementation plan Implement municipal by-laws 	<ul style="list-style-type: none"> Create enabling environment for NGOs and private initiatives to achieve safe and sustainable FSSM
Households	
<ul style="list-style-type: none"> Timely and regular cleaning of septic tanks through approved entities Regular maintenance and monitoring of septic tanks Timely payment of user fee and/or charges, if any, towards FSSM services Practice building by-laws for construction of OSS 	<ul style="list-style-type: none"> Engage with decision-makers at State and ULB level to ensure that they receive good quality FSSM services

7.5. ANNEXURE 5: Existing FSTPs in India

Name of City/FSTP	State	Ca- pacity (KLD)	HHS covered	Treatment Technology	Cost (INR in million)	Funded by
Devanhalli	Karnataka	6 KLD	5,632	Gravity based biological treatment technology	6.7	BMGF
Bansberia	West Bengal	50 KLD	24,276	Sludge Drying Beds (SDBs)	N.A	AMRUT
Brahmapuram	Kerala	100 KLD	103,920	Upflow Anaerobic Sludge Blanket Digester (UASBD), Moving Bed Biofilm Reactor (MBBR), SDBs	42.5	GIZ
Leh	Jammu & Kashmir	12 KLD	3,500	Gravity based aerobic stabilisation using Planted Drying Beds (PDBs)	5.4	BMZ
Kanchipuram	Tamil Nadu	23.4 KLD	10,507	Screens, SDBs, Horizontal Planted Gravel Filters (PGFs), Maturation Pond	49.3	AMRUT
Puri	Odisha	50 KLD	24,200	Liquid Solid Separation (Co-treatment with STPs)	17.4	AMRUT
Warangal	Telangana	15 KLD	N.A	Screening, Pasteurisation, Dewatering, Thermal drying and pyrolysis, MBBR	12	GIZ
Narsapur	Andhra Pradesh	15 KLD	15,683	Screening, Pasteurisation, Dewatering, Thermal drying and pyrolysis, Phytoid	12	GIZ
Wai	Maharashtra	70 KLD	8,500	Screening, Pasteurisation, Dewatering, Thermal drying and pyrolysis, phytoid, MBBR, Activated Carbon Filter (ACF), Planted Sand Filter (PSF), Ozonation	18	GIZ
Sinnar	Maharashtra	70 KLD	14,100	Screening, Collection tank, Clarifloculator, UASBD, Anaerobic Baffled Reactor (ABR) Ozonation, ACF, PSF and SDBs	15.1	N.A
Tenali	Andhra Pradesh	15 KLD	10,000	MBBR	3	Municipality
Bhubaneswar	Odisha	75 KLD	45,153	Decentralised Wastewater Treatment System (DEWATS)	35.4	AMRUT
Jhansi	Uttar Pradesh	6 KLD	3,000	PDBs with Integrated Settler & Anaerobic Filter and Horizontal PGF	20	Municipality
Sambalpur	Odisha	20 KLD	10,362	DEWATS	19.2	N.A
Brahmapur	Odisha	40 KLD	20,362	DEWATS	24.8	N.A
Rourkela	Odisha	40 KLD	20,745	DEWATS	21.5	N.A
Dhenkanal	Odisha	27 KLD	22,003	Screen and Grit Chamber, Stabilisation Reactor, SDBs, Integrated ABR & Anaerobic Filter, PGF, Collection Tank, Sand and Carbon Filter, Pasteurisation	28.5	N.A
Shahganj	Madhya Pradesh	8.2 KLD	2,200	Liquid solid separation in settler, SDBs, leachate sump, PGF, Polishing pond	0.8	N.A
Adhartal	Madhya Pradesh	50 KLD	20,500	MBBR	8.89	N.A
Garha	Madhya Pradesh	50 KLD	20,500	MBBR	8.89	N.A
Polipathar	Madhya Pradesh	50 KLD	20,500	MBBR	8.89	N.A
Ambikapur	Chhattisgarh	5KLD	29,112	Hybrid (Bio Treat + MBBR)	2.35	AMRUT
Rajnandgaon	Chhattisgarh	100 KLD	31,823	DEWATS	1.05	Municipality

HHS : Households

Source : NFSSM Alliance India

7.6. ANNEXURE 6: Existing FSTPs in Nepal

City	Con- struction Year	Start of Op- eration	Popula- tion	Faecal sludge capacity (m ³ /day)	Treatment Technology	Cost (\$ in million)	Funded by
Pokhara	2000	2017	156,312 ⁱ	35 m ³	Planted Sludge Drying Bed and Leachate Treatment system	N.A	ADB
Gulariya	2015	2016	48,875	3 m ³	Sludge Drying Beds, Anaerobic Baffled Reactor, Constructed Wetland	0.03	UK Aid
Lubhoo, Mahalaxmi Municipality	2016	2016	*	6 m ³ per week	Bio-gas Digester, Planted Sludge Drying Bed, Integrated Anaerobic Baffled Reactor, Planted Gravel Filter	0.07	BORDA

7.7. ANNEXURE 7: Roles and responsibilities of key actors in the study countries

Functions	Bangladesh	India	Nepal	Pakistan ⁱⁱ
Planning/ policy formulation	MoLGRDC	MoHUA, CPHEEO	National Planning Commission (Cr.) Ministry of Water Supply and Sanitation (Cr.) Municipal Council (local)	National, provincial & local/ district governments
Financing	Planning Commission and MoF	Central Govt.- Urban Development Schemes, State DPHE, State Water supply and Sanitation Board	MoF Town Development Fund	MoF, Provincial and local Govt through annual development plans
Regulation	DPHE, LGIs	ULBs, Gram Panchayat, State Govt.	Ministry of Environment (Department of Environment)	Regulatory framework by the provisional Govt. in accordance with the national sanitation policy
Implementation	DPHE, LGIs, WASAs, LGED	ULBs, Gram Panchayat, State Govt.	DWSSS Local Government WUSC	National sanitation policy implementation committee mentioned in the NSP
O&M	DPHE, LGIs, WASAs, LGED, BDA	ULBs, Gram Panchayat, State Govt.	Department of Water Supply and Sewerage Local Government WUSA	Local government private sector NGOs
Monitoring and evaluation	LGD	CPCB, SPCB, ULB, Gram Panchayat, Ministry of Social Justice and Empowerment	MOWSS (Monitoring and Evaluation Section) Local Government	Self-monitoring by each department, federal, national, district/ town & UC level. NGOs & private sector are encouraged, provincial environment protection acts

* It was constructed to treat faecal sludge collected from temporary settlements made for earthquake victims in the Kathmandu valley

ⁱ Based upon census 2001 Report

ⁱⁱ Pakistan currently does not have an FSM policy

7.8. ANNEXURE 8: Comparative Analysis - Regulatory and Institutional Framework for FSM for the study countries

(Framework adopted from FSM Toolbox, updated by Athena Infonomics)

Regulations needed for containment	Existing/ In progress/ Not there		
	IND	BD	NP
Construction of Toilets and OSS	Existing	Existing	Existing
Toilet and OSS construction specifications	Existing	Existing	Not there
Requirement for improving sub-standard toilets and OSS	Existing	Existing	Existing
Clear procedures for approval, inspections of toilet and OSS	In Progress	Not there	Not there
Permits for OSS construction	Not there	Not there	Not there
Guidelines for maintenance of OSS	Existing	Not there	Not there
Registration and licensing of contractors for construction of toilets/ OSS	Not there	Not there	Not there
Registration and licensing of masons for construction of toilets/ OSS	Not there	Not there	Not there
Penalties for not constructing proper toilets	Existing	Existing	Not there
Penalties for not constructing proper OSS	Not there	Existing	Not there

■ Existing
 ■ Not there
 ■ In Progress

Institutional requirements for containment	Institutional responsibility exists? (Yes/No)		
	IND	BD	NP
Operation and maintenance of OSS, such as for public toilets through local government, private contractors and/or non-governmental organisations	Yes	Yes	Yes
Maintenance and updating of OSS database by government	Yes	Yes	Not there
Access to design/ advisory services on OSS	Yes	Not there	Not there
Access to OSS construction services (new and improvement)	Not there	Not there	Not there
Advocacy and improved services for toilets and OSS	Yes		Yes


■ Yes
 ■ No

IND - India, BD - Bangladesh and NP - Nepal

Regulations needed for desludging and transport	Existing/ In progress/ Not there		
	IND	BD	NP
Standards / guidelines / procedures for desludging of septic tanks, pits and cesspools	Existing	Not there	Not there
Established desludging frequencies	Not there	Existing	Not there
Established safety requirements including PPE for workers	Existing	Existing	Existing
Enforcement of penalties for not desludging at prescribed intervals	In Progress	Existing	Not there
Enforcement of penalties for not desludging wearing proper protective equipment	Existing	Not there	Not there
Clear license requirements (registration, examination, certification and annulment) for desludging/ transportation contractors	Not there	Existing	Not there
Clear license requirements (registration, examination, certification and annulment) for desludging/ transportation personnel	Not there	Existing	Not there
Fixed tariffs for desludging/ transportation	Not there	Not there	Not there
Regulations on safety and road-worthiness of vehicles	Not there	Not there	Not there
Regulations requiring zone and time of operations, accidents and spills, proper disposal, record keeping, route planning	Not there	Not there	Not there
Standards / guidelines / procedures for tanker operations	Not there	Not there	Not there
Disposal area allocation	Not there	Not there	Not there

 Existing
  Not there
  In Progress

Institutional requirements for desludging and transport	Institutional responsibility exists? (Yes/No)		
	IND	BD	NP
Operation and maintenance of OSS, such as for public toilets through local government, private contractors and/or non-governmental organisations	Yes	Yes	Yes
Maintenance and updating of OSS database by government	Yes	Yes	Yes
Access to design/ advisory services on OSS	Yes	Not there	Not there
Access to OSS construction services (new and improvement)	Not there	Not there	Not there
Advocacy and improved services for toilets and OSS	Yes	Not there	Yes

 Yes
  No

IND - India, BD - Bangladesh and NP - Nepal

Regulations needed for treatment/ reuse	Existing/ In progress/ Not there		
	IND	BD	NP
Regulations/ guidelines on design, operation and maintenance of facilities	Existing	Not there	Not there
Established effluent/ by product/disposal standards	Existing	Existing	Existing
Established tariff for treatment	Not there	Not there	Not there
Training of personnel and regular use of PPE	Not there	Not there	Not there
Regular inspection of treatment operations	Not there	Not there	Not there
Penalties on not following treatment operation regulations	Not there	Not there	Not there
Penalties on discharging effluent without attaining recommended standards	Not there	Not there	Existing
Penalties on disposing bio-solids without attaining recommended standards	Existing	Not there	Existing
Regulations/ guidelines/ operational procedures for safe disposal of treated faecal matter	Existing	Not there	Not there
Regulations/ guidelines on standards of effluent for various uses	Existing	Not there	Not there
Regulations/ guidelines on standards of bio-solids for various uses	Not there	Not there	Existing
Regulations/ guidelines on safety, monitoring and handling of sewage/ faecal sludge end products	Not there	Not there	Not there
Regulations/ guidelines promoting reuse of sewage/ faecal sludge end products	Not there	Not there	Not there
Established tariff for by-products	Not there	Not there	Not there

■ Existing
 ■ Not there
 ■ In Progress

Institutional requirements for treatment/ reuse	Institutional responsibility exists? (Yes/No)		
	IND	BD	NP
City Govt. department/ unit with responsibility to plan and execute establishment of treatment facilities	Yes	Yes	Yes
Private consultants with expertise to plan and design treatment facilities	Yes	Yes	Yes
Private contractors with capacity to construct, supply and install treatment facilities	Yes	Yes	Yes
City Govt. department/ unit with responsibility to apply regulations on management of treatment facilities	Yes	Yes	Not there
Regular inspections and enforcement actions on regulations	Not there	Yes	Not there
Private operators accredited with proper structure and systems to provide operations and maintenance of treatment facilities	Not there	Yes	Yes

■ Yes
 ■ No

IND - India, BD - Bangladesh and NP - Nepal

7.9. ANNEXURE 9: Shit Flow Diagram: Sakhipur (pre and post intervention)

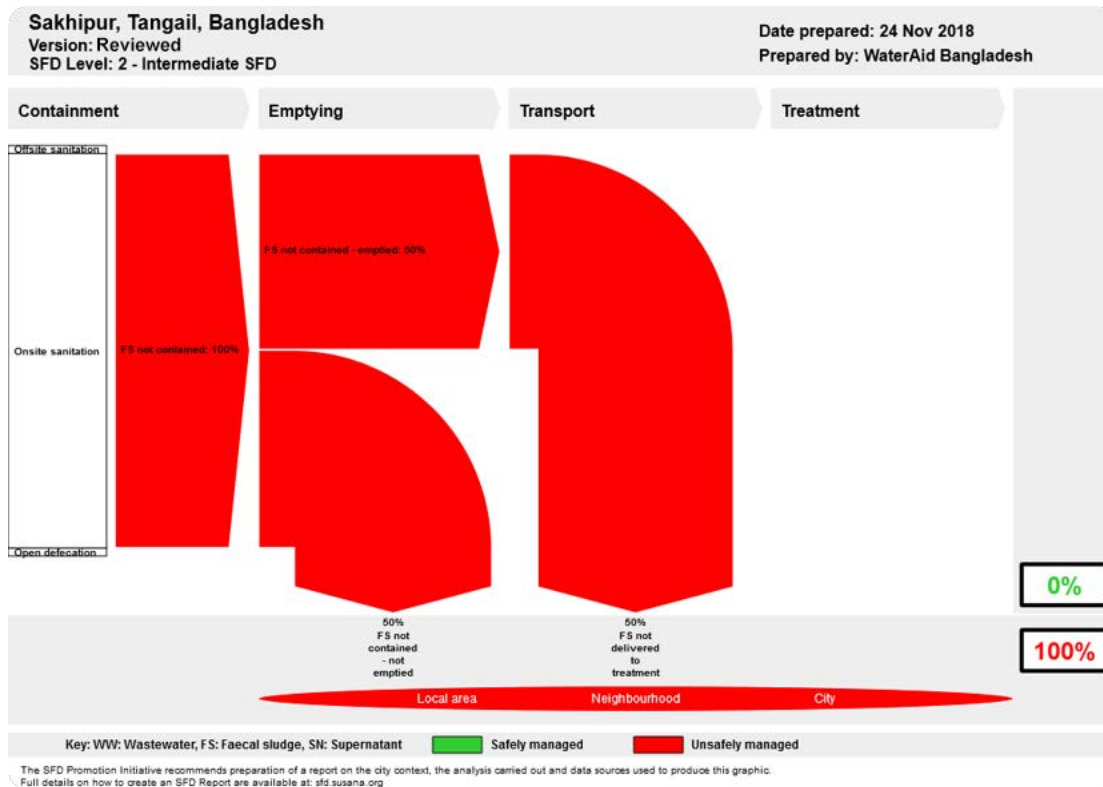


Figure: Excreta Flow Diagram of Pre-Condition of Co-Composting in Sakhipur

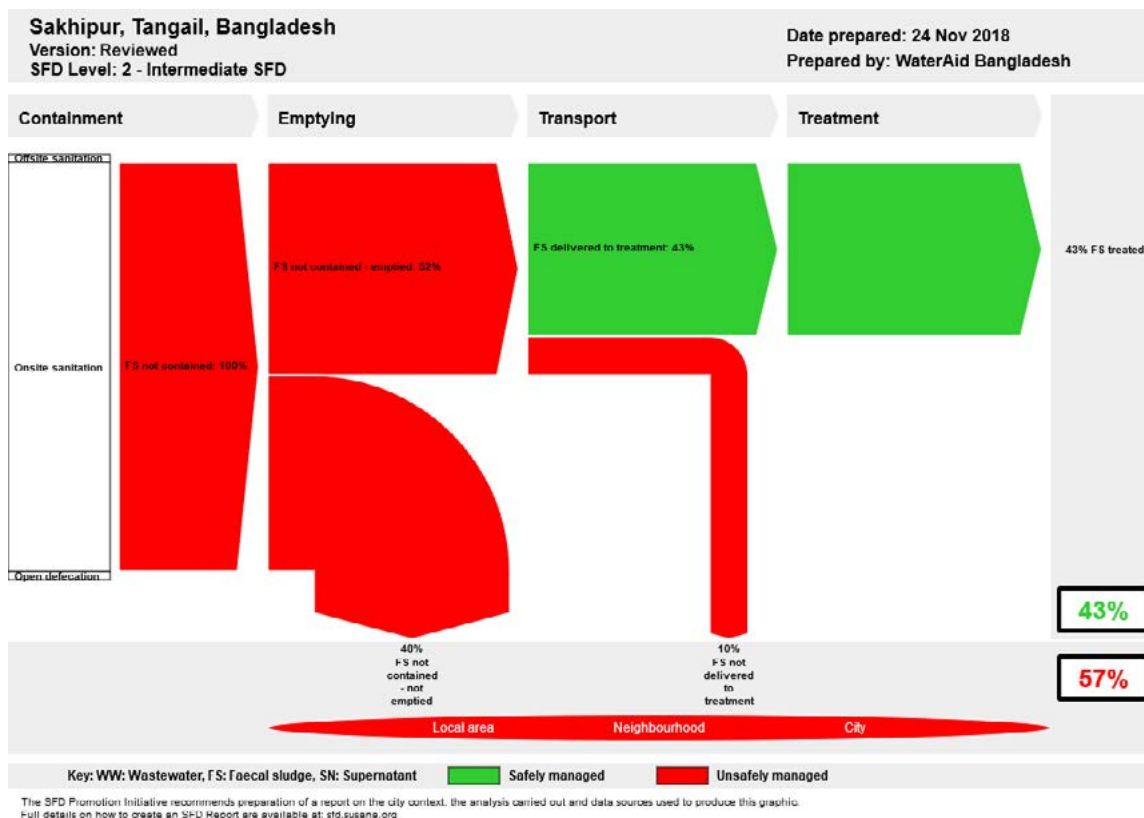
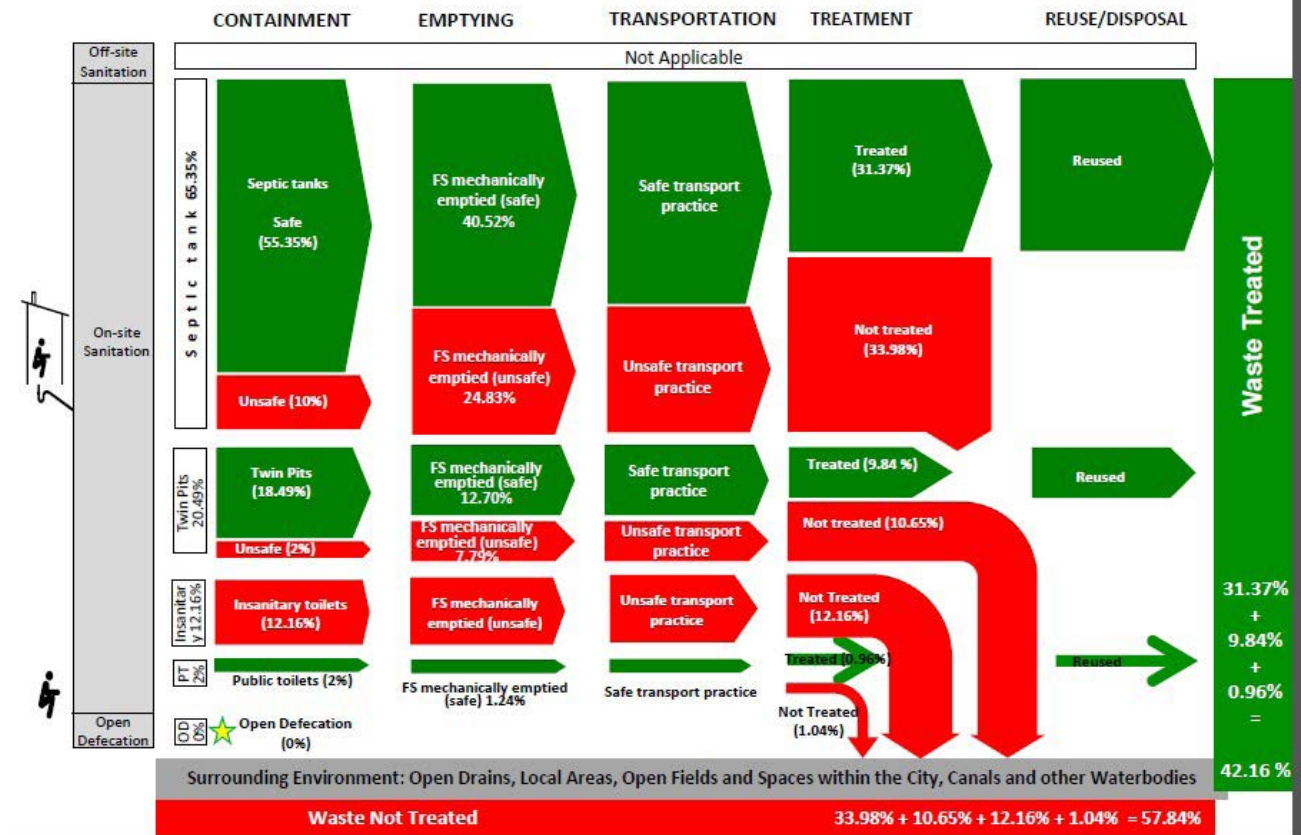


Figure: Excreta Flow Diagram of Post-Condition of Co-Composting in Sakhipur

7.10. ANNEXURE 10: Shit Flow Diagram: Greater Warangal Municipal Corporation

SFD for Greater Warangal Municipal Corporation, 2017



7.11. ANNEXURE 11: Recommended planning framework for FSM

Advocacy		
<ul style="list-style-type: none"> • Sensitisation of decision makers – exposure visits • Evidence-based advocacy – including where it fits into the larger sanitation issues of the city/ context 		
Stakeholder Consultation		
<ul style="list-style-type: none"> • Consensus building – involved stakeholder consultations • Demand creation – households, communities, RWAs, etc. • Dialogue with the desludgers 		
Institutional Setup		
<ul style="list-style-type: none"> • Gaining confidence/ establishing credibility – other projects – convergence of agenda • Detailed cell for FSM interventions <ul style="list-style-type: none"> • Capacity to perform functions related to FSM interventions • Enforcement and monitoring • Technical know-how • Establishing systems and mainstreaming FSM activities as part of larger sanitation setup 		
Regulations (informing/ informed from different levels)		
<ul style="list-style-type: none"> • Review of existing environmental, building and other relevant Acts, guidelines and standards • Septage guidelines • Licensing for desludgers • Safety norms • Building by-laws/ codes • Enforcement mechanism 		
Planning		
<ul style="list-style-type: none"> • Consult other planning documents (land use, other infrastructure) • Explore convergence with other schemes/ projects • Detailed situational assessment • Awareness and IEC campaigns – designed for different stakeholders • Stakeholder consultations • Capacity building – masons, desludgers, planners, sanitary engineers, consultants, etc. 		
FSM Plan – focus on linking the value chain – phase wise planning	FSM Service Provision Plan	FSM Treatment
<ul style="list-style-type: none"> • Desludging – regularising plan – moving towards scheduled desludging • Choice of desludging equipment/s (accessibility issues) • Worker safety • Faecal sludge characterisation • Technology choice – selection process 	<ul style="list-style-type: none"> • Create administrative setup – with clear responsibilities • Phase wise service provision plan with clear outcomes/ indicators • Monitoring and evaluation mechanism 	<ul style="list-style-type: none"> • Implementation plan (with clear implementation roles) • Project monitoring mechanism • Monitoring performance of plant <ul style="list-style-type: none"> • Mechanism to be established • Quality of effluent and sludge • Quality of reuse product/ compost/ other • Capacity building <ul style="list-style-type: none"> • O&M • Performance monitoring

Financial Planning
<ul style="list-style-type: none">• Capital costs and O&M costs• Avenues for financing• Role of private sector• Business models
Procurement
<ul style="list-style-type: none">• Creating RFP for procurement• Procurement and tendering process
Private Sector
<ul style="list-style-type: none">• Dialogue• Explore different models of engagement• Contribute to development of the ecosystem• Capacity building

7.12. ANNEXURE 12: Stakeholders Consulted

1.a. Lakshmipur, Bangladesh

Name	Organisation
Alhaz M. A. Tarek	Lakshmipur Pourashava
Md. Rafiqul Islam	Lakshmipur Pourashava
Councillor 1	Lakshmipur Pourashava
Councillor 2	Lakshmipur Pourashava
Md. Nasrullah	DPHE, Lakshmipur
Md. Nasir Uddin	DPHE, Lakshmipur
AKM Muktadir Rahman	Lakshmipur Pourashava
A.K.M Shaheed Uddin	Lakshmipur Pourashava
Nur Karim Suman	Lakshmipur Pourashava
Abul Hossain	Lakshmipur Pourashava
Md. Mirzu	Lakshmipur Pourashava
Kamal Uddin	Lakshmipur Pourashava

1.b. Sakhipur, Bangladesh

Name	Organisation
Md. Khairul Islam	WaterAid Bangladesh
Dr. Md. Liakath Ali	WaterAid Bangladesh
Jaison Thomas	WaterAid South Asia
Suman Kanti Nath	WaterAid Bangladesh
Md. Samiul Basar	WaterAid Bangladesh
Fariha Rahman	WaterAid Bangladesh
Rajeev Munankami	SNV Netherlands
Md. Azizur Rahman	ITN-BUET
Ashish Barua	Oxfam International
Tanveer Ahsan	DevCon
Engr. M Omar Faruq	Faruq Fertilizers Limited
Alok Mazumdar	SIMAVI
Sujaya Rathi	WaterAid - Consultant

2. India

Name	Organisation
Dr. Srinivas Chary Vadela	ASCI
Dr. Malini Reddy	ASCI
Aparna	ASCI
Raj Mohan	ASCI
Abhishek	ASCI
Raja	MHO - Warangal
Amresh	Tide Technocrats
Technical person	Banka Bailoo
Sampath Rao	Truck Operator
Suresh	Digital engineer, PMU
Shrinu	Sanitary Inspector
Lakshmi	Caretaker, SHE toilet
Rohit Kakkar	CPHEEO
Akalli Muthu	WASH Institute

3. Gulariya Municipality, Nepal

Name	Organisation
Ram Chandra Poudyal	Chief Executive Officer
Mukunda Aryal	Senior Section Officer
Arjun Kumar Lamsal	Sub-engineer
Kapil Ghimire	Administrative Officer
Sahadev Yadav	Desludging Vehicle Driver
Ashok Rai	Firefighting Staff
Amber pariyar	Desludging labour
Guru Bachan B.K.	Desludging Operator
Hare Ram Bhurtel	FSTP Supervisor

7.13. ANNEXURE 13: Bangladesh: Consultation notes from Sakhipur stakeholder meeting

A Stakeholder Consultation Meeting as part of the multi-country study on FSM Landscape in South Asia was held on 1 November, 2018 at the Royal Park Residence Hotel, Banani, Dhaka. The key objective of this consultation was to get to know the various factors that have contributed to the enabling environment for FSM in Bangladesh. There was general consensus that the political commitment was the key driving force. The example shared was that of Sakhipur co-compost plant, which came out of a partnership between Sakhipur Municipality, WaterAid and BASA. Following a visit to the plant from Prime Minister's office, there is keen interest at highest political level to replicate similar intervention in other cities. Participants shared other initiatives in this direction such as publication and dissemination of IRF-FSM, working committee for developing a national action plan to implement the framework and WASH Focus Group in the Parliament. WaterAid has been advocating to include FSM as part of the commitments of political parties in the upcoming elections. One of participants commented that there are currently many evidences to build the confidence among the political leaders on FSM. But push from both the government and private sector is necessary.

Around the institutional responsibility, the participants shared that while IRF-FSM provides clear mandates, there is still lot more work needed to roll it out effectively. Sector has a key role to support

this process, particularly in addressing challenges in translating the framework into practice. IRF is not a legal document and there is need for coordination between various agencies like city corporations, WASAs and Pourashavas to implement it. There are also capacity gaps that need to be addressed. Also, there exists some complexities in official positions of different agencies.

About planning framework, it was commented that most of the consultants are technology biased, but there are not many examples of technology used in Bangladesh. Decentralised planning is prepared in every sector, but FSM issue is not prioritised as such and there is unwillingness on part of officials/engineers to work in sanitation sector. IRF allocates most of the responsibilities to LGIs, which can be implemented through various agencies. There was a concern that often municipalities focus on the infrastructure rather than sustainable service delivery. They wait for another grant to maintain the FSTPs. It is also a fact that they are not generating sufficient revenue to sustain the FSM services. However, there is potential for them to work with NGOs and other development agencies to help implement sustainable FSM services.

Participants recognised that capacity building is a huge need. There is currently a grant from Bill and Melinda Gates Foundation to ITN-BUET on national capacity building. DPHE and DWASA are also coming forward to build capacity. But training, skill development, human

resources all are part of capacity building which needs proper assessment and operational plan. Stakeholders consultation need to be conducted considering the value chain. There are some good practices, from which best examples for different parts of the value chain can be taken. One participant commented that influx of huge capital cannot guarantee successful intervention unless accompanied by building capacity.

On involvement of private sector and their challenges, it was mainly limited to informal emptiers. SNV arranged two national conventions for the sludge emptiers. The challenges are that the emptiers are not so much interested in doing such kind of jobs and also they do not want their next generations to be involved in this business. Another comment was that the municipality can dispose of the sludge to the private sector, who can use it as raw material for fertilizer. It was shared that multilateral foundations do not invest separately for FSM, rather those are components of some big projects. If good interventions can be showed, positive perception both from the lenders and general people can be built.

Moving forward for a successful FSM system, all components need to be covered. Technological, civil construction and social considerations should be integrated. Planning should be done considering the whole value chain. Mapping and enforcement should be done by the municipality for scheduled desludging. It was commented that construction of the plant or the creation of demand, which

should be done first continues to be an issue where there is no clear consensus.

On technical aspects, it was commented that Department of Environment (DoE) does not have any standards for faecal sludge, although they are coming forward for the standardisation. FSM Network is also advocating DoE for the standardisation. WaterAid shared that getting certificate for the co-compost from Department of Agriculture extension has been a long process. EUWAG is collecting data and conducting study on technology choice. There is a need of capacity for monitoring different parameters, particularly around treatment and end use products. Bangladesh Agricultural University has a full-fledged laboratory to test faecal sludge and ICDDR, B can test the pathogens.

However, more such facilities are needed. It was shared that universities can support this and college students could be trained on FSM. Overall, it was felt that both the government and major multilateral agencies, along with private sector should come forward to scale up FSM. Civil society organisations along with communities can play a supportive role.



Participants in Stakeholder Consultation Meeting

Some key takeaways and recommendations were identified at the end of the meeting:

- Political commitment is a key driving force and needs to be ensured
- IRF-FSM provides a good framework to start with
- Community involvement and mobilisation
- Consider the whole sanitation value chain while planning
- Capacity building before any huge intervention
- Creating evidence based examples
- Involvement of private sector is important
- Safe disposal of sludge and innovative marketing of end products
- Innovative interventions should be within the thinking
- Ensuring quality throughout the sanitation value chain is important
- Eliminating superstitions on the usage of end product
- Involvement of academic institutions and training college students on FSM



Nupur Akter is one amongst the few women who works with dignity and pride at the Sakhipur co-compost plant, Tangail, Bangladesh
WaterAid/FrameIn/Abdullah Al Kafi

A study by the Urban Sanitation Working Group, South Asia Region, WaterAid | September 2019
Contact: Jaison Thomas at JaisonThomas@wateraid.org

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